THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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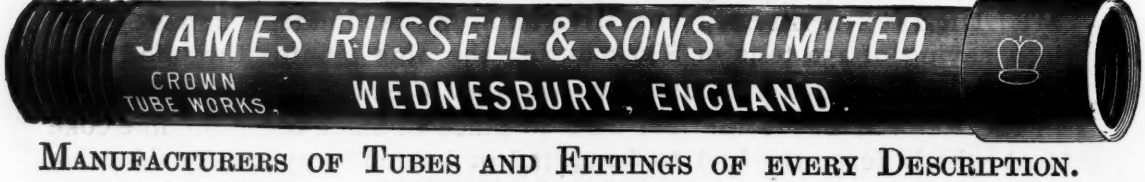

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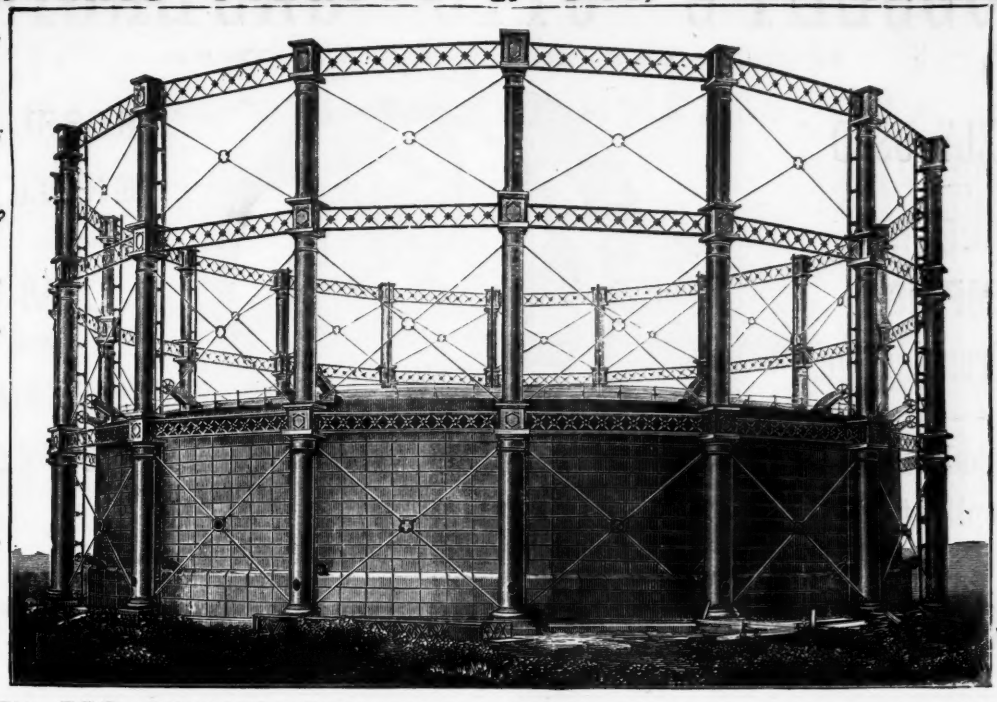

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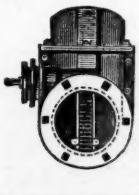

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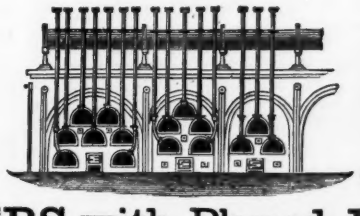

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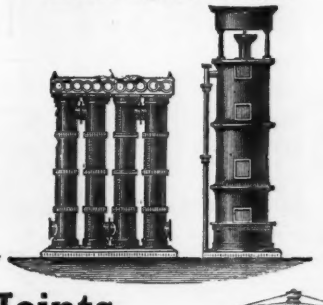

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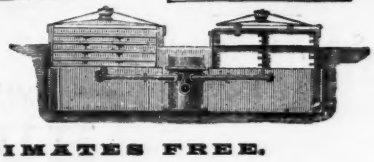

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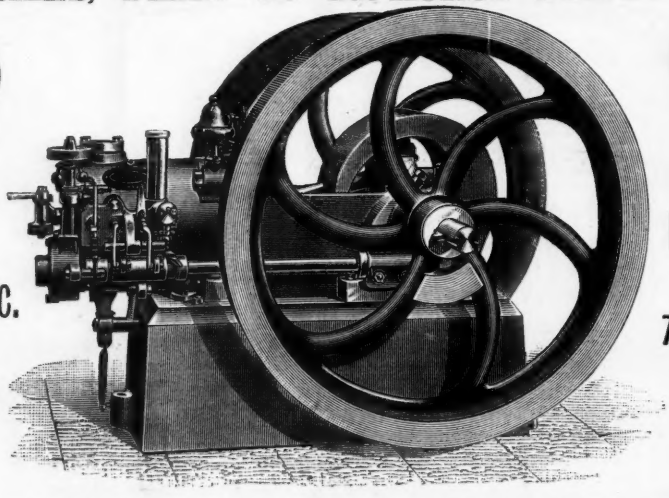

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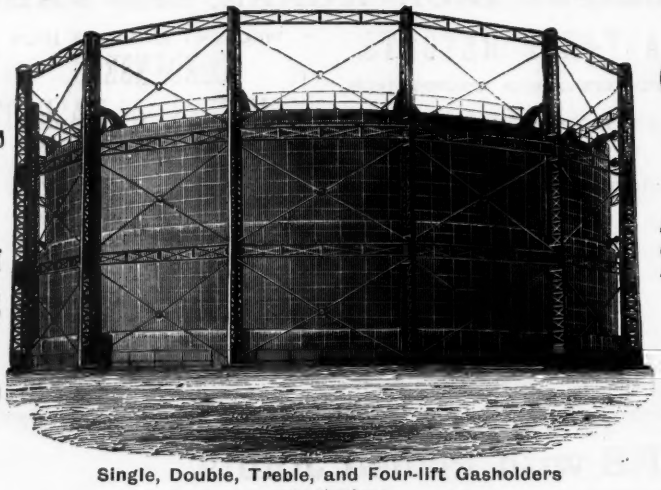

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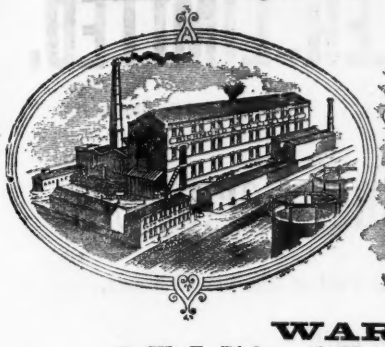

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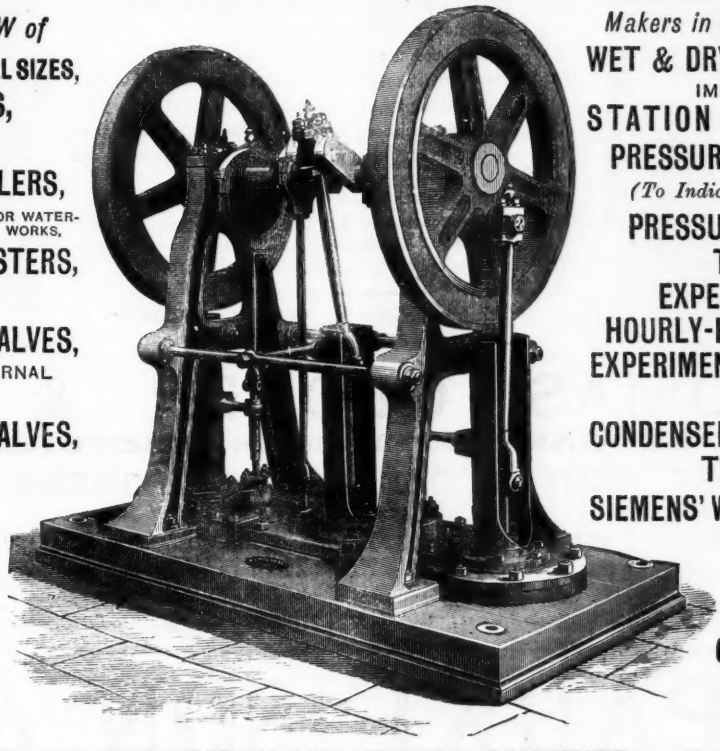

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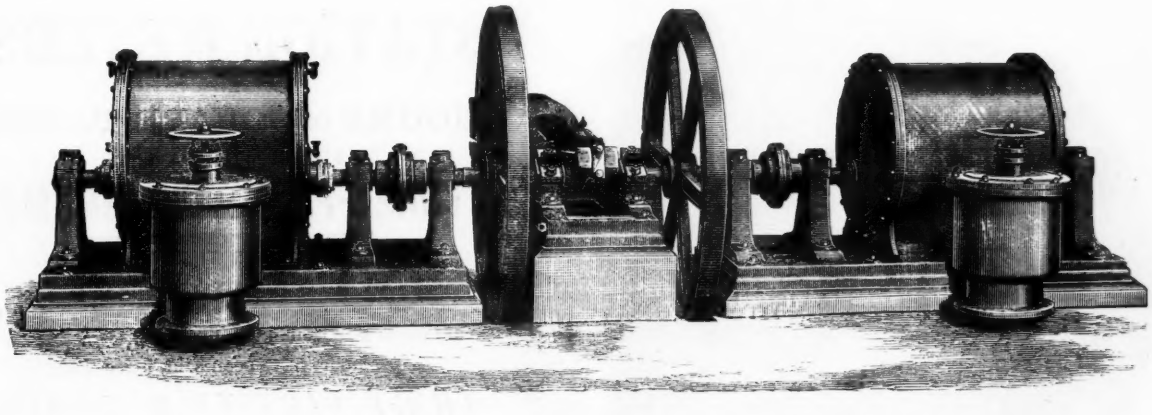

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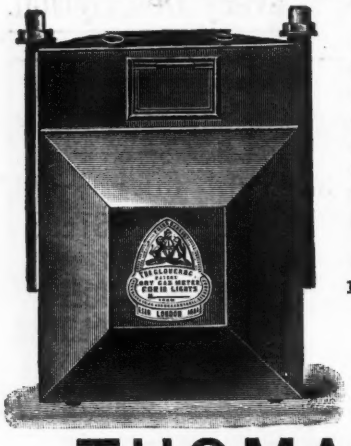

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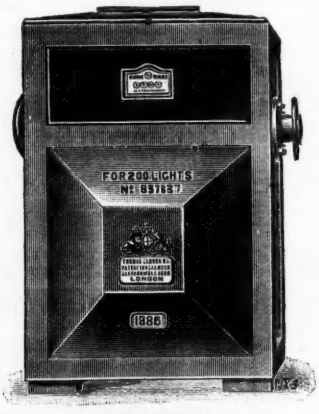

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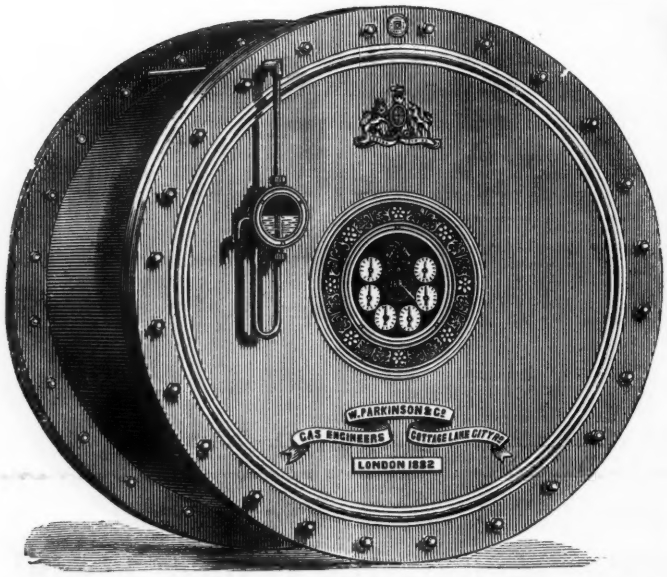

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No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 15, 1892.

The Miners' Fault.

AT the moment of writing these lines, there is every prospect of the extraordinary experimental strike of the coal miners of the Durham fields, and of the men of other districts who own immediate allegiance to the Federation, being entered upon to the fullest extent talked about for weeks past. The acquiescence of the Durham men, who have a local organization of their own, in the policy initiated by the southern men, was only declared last week. This addition to the ranks of the systematic idlers has greatly increased the gravity of the situation; but it leaves the fundamental questions of right and wrong, wisdom and folly, which must occur to all observers of this remarkable labour movement, precisely where they were. The position created by the adoption of the "stop "fortnight" is indeed worthy of the most attentive and dispassionate consideration by all classes of the public. The issue would have been clearer if every pit in the land had been stopped at the same moment; but matters are complicated by the fact of the Scotch miners and the men in some other districts having declined to "play" for the stipulated week or fortnight. In consequence of this lack of agreement, it is to be feared that when the futility of the counsels of the Federation leaders becomes manifest, as it will surely be in due time, these "blind "leaders of the blind" will be able to shield themselves by the plea that their policy failed, not because it was essentially bad, but because it was not applied with sufficient thoroughness all over the country.

So far as the supply of gas coal is concerned, there is no cause for great anxiety. The miners might "play" for a very much longer period than their means permit, without putting the gas undertakings to any generally serious inconvenience, although we are not prepared to deny that, here and there, a good deal of trouble has been brought upon individual managers by the readiness of coal contractors to plead the "strike argument" as a means of squeezing more money out of purchasers. But this trouble, of course, is all in anticipation of the actual strike; and no critical history of this portentous incident of contemporary industrial developments will be complete that does not duly discriminate, and put in their proper sequence of date and importance, its antecedent, accompanying, and consequential results. Who was to foresee that the mere "wind" of the Federation proposals was to force up the price of best house coal in London to 35s. per ton? Not the men's leaders, certainly; for they have repudiated all responsibility for wilfully bringing about such a state of things. Neither did they mean to stop mills, factories, iron-works, steamships, trains, or do any other of the infinitely ramified pieces of mischief which it is now certain will attend their rash action. According to the declaration of the Federation leaders, they had no notion that a single poor child would have to go supperless and shivering to bed in consequence of their conduct. They appear to have reasoned in this way: "The value of coal is falling, and the masters say that "wages must go down. This is partly due to the accu- "mulation of stocks; and therefore if we left the coal in "the ground the stocks would be cleared off, and we could "arrange for the future to bring up just enough to sell at "prices that will suit the owners and ourselves, and no "more." This is a perfectly intelligible line of argument; and it is one, it may be remarked, which is not a new invention of Trade Union officials. On the contrary, it is as old as the first beginnings of commerce, and arose from the desire of primitive producers or owners of useful commodities to keep a good market for their articles of trade. We may be sure that the savage hunter of the pre-historic times when the mammoth roamed where the Beckton Gas-Works now stand, had wit enough to stay at home, and let the pelts remain on the animals' backs, when he discovered that the market was temporarily glutted. So he "played" in his cave, or rush-shelter, just as the pitman is "playing" now in his more comfortable tap-room. The only novelty in the proceedings of the modern man is that he has less of the game in his own hands.

For it must be understood that there is nothing essentially immoral in the endeavour to cure a glut by restraining production. It is, indeed, a commonplace of all producers' policy. When an agriculturist discovers that a particular crop is unremunerative, he can grow less of it, at his peril. Similarly, we are far from holding that if the circumstances of the coal industry a month ago had been as simple, and as capable of such ready remedy, as we have put them in the preceding paragraph, it would not have been perfectly legitimate for the remedy to have been applied. And this might have been attempted at the instance of either masters or men, or of both together. It is plainly a matter of indifference to the purchaser whether one or the other party among the producers determines to stop adding to the stocks in the market until accumulations shall have been cleared off. In trade, where every man fights for himself, it would be quite as open to a buyer to take advantage of the existence of heavy stocks to lower his offers, as to a producer to keep stocks short, or out of sight, in order to prevent this effect.

All this is mere commonplace. There are many commodities in the world which are maintained in value by the simple expedient of not swamping the market with them; and we can all think of others—such as matches, for example—which have apparently been forced down to hopeless cheapness simply through the pressure of over-competition in production. The point is, however, with regard to all such cases, how the regulation of production is to be managed in order to produce exactly the effect desired—no more and no other.

It has been stated that this regulation might conceivably be set in operation by the owner or the workmen, who form the two modern divisions of the order of producers. Since their interest in keeping up the value of their produce is the same, while the general direction and control of its disposal is in the hands of the former division—that of the owners—how is it, we are led to ask, that they do not effect this regulation whenever they please, quite as a natural part of their business operations? Why do not the colliery-owners, for instance, of Durham, or Yorkshire, or any other district, or of all the coal-fields together, simply arrange coal values by ordering their pits to be closed for a week, a fortnight, or any length of time they think fit? The only valid reason why they do not act in this way must be because they cannot. Besides, they know, by observation and by partial but instructive experience, that such proceedings would be futile. And as it would be with the masters, so it must be with the men. What is impossible to the brains of an industry cannot be practicable by its feet and hands. The lesson that one division of the producing interest learnt long ago has to be taught to the other; but the teaching will be all at the cost of the learners, while the adepts will pocket the fees.

In truth, there is nothing that the newly-organized workers of this and other countries more urgently need to learn thoroughly than the omnipotence of law and the limitations and proneness to error of human counsel. There seems to be a notion abroad that Trade Unions can do no wrong, that the enfranchised and organized working man is infallible, and that he can ask and have, not merely in the matters of wages and hours of work, but in the greater issues of industrial and commercial politics, and that he can even mould the moral law to his desires. This is a delusion which requires to be exposed whenever met with. Whatever may be the case in some instances, we are persuaded that the chief reason why Trade Unions are regarded in many quarters with suspicion, and held at bay, is the presumption of their paid officials to be their own law-givers. Every man has a right to make the best terms he can for his labour; and if he prefers to relinquish his individual freedom for the sake of the protection and the feeling of solidarity with his fellows which membership of a Trade Union confers, that is his affair. All the same, he must not deny to another the liberty of choice which he has himself exercised. Faithfulness to engagements willingly entered into, truthfulness of word and deed, the ability to recognize and respect what is worthy in opponents—these qualities must not be treated as old-fashioned and exploded superstitions by any party of the community that really desires the support of the remainder for working out its own ends. We should like to see these considerations more regarded than they are by the self-appointed labour leaders. They knew how to get rid of a Michael Henry when they caught him in an act of treachery to themselves; but other means are required for dealing with the misrepresentations of a Ward and the tyranny of a Wilson. It is the idlest of stump-orators' tales to describe the labouring classes of the present day as "down-trodden slaves." Quite the contrary. As a modern writer declares: "Preponderating "political power has well-nigh everywhere passed, or is "passing, to them. A century ago the masses were "nothing. Now they are everything, or are fast be-"coming everything." But the same writer concludes his admission with the pregnant caution: "Assuredly, the "masses will be monstrous fools if they do not use the "power placed in their hands to better their material "condition. As assuredly, they will be more monstrous "fools still if they use it unjustly. Labour, like capital, "is under the moral law. Here, too, it holds good that "'*quidquid fit contra conscientiam ædificat ad Gehennam*'—a "very real hell upon earth." Unfortunately, men do not learn by the experience of others, or we should not now be witnessing an insane attempt on the part of Labour to effect what Capital has over and over again failed to do—regulate the market in accordance with its own desires, regardless of the loss and suffering of the rest of the community.

The Result of the Chartered Assessment Appeals.

THE assessment appeals of The Gaslight and Coke Company came before the Court again last Saturday, when a tabular statement of the effect of the judgment, as worked out for the different parishes, was put in. The remainder of the day was occupied by the inevitable controversy on the subject of costs; and though the matter was adjourned to yesterday, it was not even then finally disposed of. We cannot, therefore, yet report the end of this prolonged affair. According to the table showing the apportionment of the rateable value of the property among the various parishes where the assessment has been appealed against, whereas the total of the figures appearing in the valuation lists is £418,692, and the total as stated in the Company's cases was £168,256, the figures as settled by the judgment are £378,097. The judgment cannot therefore be described as merely "splitting the difference." The mean of the two totals in the dispute is £293,474, upon which the judgment is a rise of £84,623, or more than one-half of the total of the Company's valuation. The comparatively small sum of £40,595 has been knocked off from the parish lists, while £209,841 has been added to the offered figure of the Company. This can hardly be scored as a triumph for the Company's advisers. It is difficult to write with patience of this kind of half-legal, half-technical business, which subjects the proprietors of gas undertakings and the representatives of the ratepayers—and eventually the public—to a quinquennial "bleeding" for the sole profit of a horde of hungry non-producers in the shape of valuers and lawyers. Doubtless all these gentlemen are very worthy and clever persons; but we altogether fail to admire the system which renders them necessary in connection with the rating of gas-works for the relief of the poor. It is the public who have to support them in the long run; and the reflection occurred to us more than once, while these terribly costly appeals were in progress, that the scene in the Clerkenwell Court-House ought to have been photographed, if it had been possible, from the mental and physical point of view of the Chairman. He saw day after day dozens—literally dozens—of wigs concentrated before him, supported by an equally strong second line of black-coated gentlemen who were the surveyors, engineers, valuers, solicitors, accountants, and so forth. And every wig was, as it were, the focus upon which converged months' work of a small army of experts, all rejoicing in the certainty of big fees however the result might turn, and fortifying themselves with the happy prospect of having it all over again five years hence. The whole system is simply a disgrace to the administrative order of the country that endures it. Meanwhile, whether this or any other variety of litigation is or is not a bright point of the British Constitution, the first business of the parties to it is obviously to win, which is what The Gaslight and Coke Company failed in doing this time. Their failure, we fear, is not a good augury for the future rating of gas undertakings in the Metropolis or outside. We shall be absolved from any charge of wantonly questioning the conduct of the Company's case by the professional gentlemen engaged, inasmuch as their leading Counsel—Mr. Littler, Q.C.—actually went out of his way, at the hearing on the 26th ult., to point out how badly off his clients were left as the result of their efforts to obtain a lightening of their burden of rates. This was a wholly uncalled-for observation, since it could not affect the issue, and merely introduced another bitter drop into the cup of disappointment which everybody concerned in getting up and presenting the Company's case has had to drink. If it comes to a question of ascribing blame to the representatives of the losers, Mr. Littler himself will not escape; for he needlessly "antagonized" the Court throughout the inquiry, and his management of his case compares very unfavourably in most respects with that of the Solicitor-General (Sir Edward Clarke, Q.C.) for the respondents. It is, of course, impossible to sound the depths of the judgment, and ascertain how its terms were arrived at; but we are shrewdly of opinion that the appellants overdid their parts. Carried a very little farther, their case would have demonstrated that the stupendous hereditament involved

in the appeals has no value at all. It is unnecessary, however, to pursue these reflections. Such as it was, the Company's case was presented most ably by their witnesses; but wherever the superior talent lay, the fact remains that the parishes are on the winning side this time.

The Southern and Midland Association Meetings.

Two District Gas Managers' Associations met last week—the Southern in London, and the Midland in Birmingham; but, owing to an unfortunate conspiracy of circumstances, the latter was practically a spoilt day. By a misfortune quite unprecedented in the history of such gatherings, both the first and the second entries in the programme failed to come off in regular order. The President, Mr. W. Littlewood, of West Bromwich, excused himself at the last moment from attending, on the ground of illness; and he did not even send his Inaugural Address to represent him in spirit. Mr. Hunt was due to open a seasonable discussion upon photometry and standards of light; and a cruel Nemesis, in the form of a Committee of the Gas Department, kept him otherwise engaged until past the hour fixed for his appearance before the Association. The day was thus deprived of its most interesting events, which was the more to be regretted as the attendance of members was good. The Executive of the Association are deserving of sympathy in the exceedingly awkward position which Fate forced them to occupy last Thursday. The good dinner with which the proceedings terminated was sorely needed to put the disappointed members once more at their ease. The Midland misfortune stands in strong contrast to the Southern meeting, which was conspicuously pleasant and successful. Mr. John Methven, of Beckton and Nine Elms, as a gas engineer of world-wide reputation in the difficult science of photometry, was a hard President to follow; but Mr. A. Dougall, of Tunbridge Wells, proved an admirable successor. His address, which will be found in another column, is one more example, and a particularly bright one, of the truth for which we have so often contended in these pages—that if a President of a technical association is worthy of his elevation to this office, he cannot fail to produce a valuable and interesting Inaugural Address if he will only confine himself to his own individual experiences for his principal matter. We have no hesitation in declaring that, in the estimation of hearers and readers of his practical, plain-spoken, and really philosophical address, Mr. Dougall has by this one effort placed himself well to the front among the younger and rising order of gas managers. It has been notorious that, in his position at Tunbridge Wells, Mr. Dougall has, until recently, been overshadowed by a more prominent and influential figure. He has bided his time, however, with conspicuous patience and loyalty; and now he is coming into his reward. The other proceedings of the Southern meeting comprised an informal exposition, by Mr. Sugg, of the novel 16-candle photometrical standard, which was criticized with some point by Mr. Methven, who spoke under all the reserve due to the impromptu character of the discussion. At the annual dinner which followed the meeting, Mr. J. W. Helps, of Croydon, the deservedly popular Honorary Secretary and Treasurer of the Association, in responding to the toast of his health, moved in appreciative terms by Mr. D. Ford Goddard, Mayor of Ipswich, and a Past-President of the Association, tentatively unfolded a hopeful scheme for extending the usefulness of the organization. It would be premature to say anything respecting Mr. Helps's suggestion; but we venture to express the wish that he will feel encouraged, by the sympathetic manner in which his remarks were received, to put his views forward in a more definite form upon the first convenient opportunity.

Sir Douglas Fox has been elected an honorary member of the Society of Engineers, in place of Sir G. B. Airy, K.C.B., F.R.S., deceased.

Death of Dr. Redwood.—The death is announced, at his residence, at Boverton, Glamorganshire, of Theophilus Redwood, Ph.D., Emeritus Professor of Chemistry and Pharmacy to the Pharmaceutical Society of Great Britain. He had reached the advanced age of 86.

The Royal Commission on Water Supply.—In the House of Commons yesterday afternoon, Mr. Ritchie announced the names of the Royal Commissioners on the London Water Supply. They are: Lord Balfour of Burleigh (Chairman), Sir George Barclay Bruce, C. E., Professor James Dewar, F.R.S., Sir Archibald Geikie, Mr. G. H. Hill, M. Inst. C. E., Mr. James Mansergh, M. Inst. C. E., and Dr. W. Ogle.

WATER AND SANITARY AFFAIRS.

It is somewhat remarkable that the House of Commons should have devoted fully three hours of its time to the discussion of the Birmingham Corporation Water Bill on the motion for the second reading. That the motion was at length carried by a majority of more than two to one, by no means assures the passing of the Bill in the present session. It now stands referred to a Hybrid Committee, armed with all the powers that such a tribunal can possess. Not only will the London County Council have *locus standi* before this Committee, but a similar position will be occupied by all the County Councils in any way interested in the measure. Thirty petitions have been presented against the Bill; and it is possible for another swarm to follow. Under the instruction moved by Mr. Shaw-Lefevre and agreed to by the House, the Committee have power to inquire into the rights of the commoners affected by the proposed works. The result, as stated by Mr. Courtney, is that, if a farmer or a commoner presents a petition three days before the meeting of the Committee, he will be entitled to be heard against the Bill; and the Commons Preservation Society will be in the same position. On the other hand, it appears that Birmingham is prepared with a whole legion of witnesses, including Sir Frederick Bramwell, Mr. Hawksley, Mr. Mansergh, and Mr. J. W. Gray. The Mayor of Birmingham will be forthcoming, together with Sir Thomas Martineau, and a cloud of eminent chemists and geologists; as well as engineers able to speak upon the merits of the Manchester, Liverpool, and Sheffield schemes. The London County Council will, of course, take care to fortify themselves, especially as the *entente cordiale* between that body and the Birmingham Corporation has been impaired by the discovery of a speech by Sir T. Martineau, showing that it was not urgency but strategy which induced Birmingham to bring forward its scheme at the present juncture. We are not quite sure that Birmingham might not retort on London, and assert that the County Council have "strategic" reasons for their professed concern lest the Metropolis should run short of water. There is also a natural feeling of vexation among the Birmingham authorities, at the unexpected falling away of the Metropolitan members after the revelation given to the House by Sir John Lubbock during the debate on the second reading. The consent to the Bill by these members was founded on the persuasion that its existence was due to a dire necessity; whereas the quotation from Sir T. Martineau's speech showed that Birmingham was actuated by a desire to anticipate London in getting hold of the sources of the Upper Wye. It was further shown that, in another speech of somewhat earlier date, Sir T. Martineau had accepted a statement by the Water Engineer (Mr. Gray) that the existing source of supply for Birmingham might suffice for another twenty years. The "great hurry," therefore, resolved itself into a scheme of rivalry. This statement of the case by Sir J. Lubbock seriously affected the chance of the second reading; and Mr. J. Chamberlain, who had charge of the Bill, had to exercise all his ingenuity to overcome the effect of the *exposé*. When the division took place, Sir J. Lubbock and some other Metropolitan members showed their sense of the situation by walking out of the House without voting.

From the remarks we have already made, it will be seen that the inquiry before the Hybrid Committee relative to the Birmingham Bill threatens to assume such proportions as to render it scarcely inferior to the coming investigation by the Royal Commission. Had Birmingham waited for the Commission instead of trying to run before it, such patience might have had its reward. Mr. Ritchie has rightly remarked that the scope of the inquiry to be conducted by the Royal Commission is less wide than it was assumed to be by some of the speakers in the recent debate. The inquiry does not traverse the whole water supply question; but, at the same time, should it be thought necessary to go outside the watersheds of the Thames and the Lea, the source to be found in Mid-Wales will most likely come under review. In that case Birmingham will necessarily have a hearing, as claiming the higher portion of the watershed feeding the Elan and the Claerwen. In contrast, there is the contingency that, after the Birmingham Corporation have expended a very large amount of the ratepayers' money on counsel and witnesses, the Hybrid Committee may declare the preamble of the

Bill not proved. It is quite possible that the Committee may consider there is no special urgency in the Birmingham case, and that it would be more proper to wait until the Royal Commission present their report. The preamble of the Bill declares that a new water supply is needed by Birmingham, and that it is necessary to go out of the Midland district to obtain it. But how far the need is pressing remains to be seem. Birmingham may be thankful if the enterprise can be postponed. It is tremendously costly, and will add largely to a debt already felt to be burdensome. The Birmingham estimate of between £6,000,000 and £7,000,000, may also serve as a warning to London, which, with its immensely larger demand and greater distance, would require an outlay augmented in proportion. If Birmingham likes to spend its millions, it may do so; and our own opinion is that London need be in no trouble with regard to the matter.

Mr. A. G. Vernon Harcourt, F.R.S., Lee's Reader in Chemistry at Christ Church, Oxford, and one of the Metropolitan Gas Referees, was last Friday elected a member of the Athenæum Club, under the terms of one of the rules which provides for "the annual introduction of a certain number of persons of distinguished eminence in science, literature, or the arts, or for public services."

The Gaslight and Coke Company's Assessment Appeals.—The parties concerned in these appeals attended the Court again last Saturday for the purpose of dealing with the allocation of the amount decided upon as the rateable value of the Company's property among the various parishes concerned, and discussing the question of costs. A statement was presented as the result of the Accountant's allocation, which was accepted on all sides, with the exception that Mr. Littler desired, on behalf of the Company, to separate the City of London into the various component parishes. The Court, however, declined to accede to this; treating the City as an aggregate appeal. A long discussion followed as to the manner in which costs should be awarded; and it had not terminated when the Court adjourned till yesterday. The report of the proceedings will be given next week.

Post Office Diligence.—A good deal of complaint is sometimes made that the officials of the Post Office do not take any trouble to secure the delivery of a misdirected or inadequately addressed letter; and therefore an instance to the contrary is worth recording. A paragraph referring to the process in use at the Govan Iron-Works, Glasgow, and elsewhere, for the recovery of the oil and sulphate of ammonia from blast-furnace gases, which appeared in the papers some time ago, found its way to America, and came into the hands of a firm in New York. These people gummed the newspaper extract on the front of an envelope bearing their name and place of business, and addressed it "To the Proprietors, Glasgow, Scotland." On arriving at the Post Office there, the letter-carrier was advised to try the Furnace Gases Company; and, after travelling about, the envelope eventually reached the makers of the plant employed at the Govan Works—Messrs. R. and J. Dempster, of Newton Heath, Manchester.

Petroleum-Engines.—At the meeting of the Institution of Civil Engineers last Tuesday, Professor W. C. Unwin, F.R.S., M. Inst. C. E., read a paper on the above subject. He gave a short account of the earlier motors worked by petroleum, and then described the Priestman engine. In this a jet of oil, controlled by the governor, and a current of air are mixed in a spraying-nozzle, which reduces the oil to very fine particles. The mixed air and spray are received in a vaporizing chamber, heated by a jacket through which the exhaust of the engine passes. During the suction stroke an additional air supply, also regulated by the governor, enters the vaporizer, and drives forward the charge into the cylinder. The charge is compressed, ignited by an electric spark, expanded while doing work, and finally exhausted; the cycle being the same as in the "Otto" gas-engine. The author gave particulars of trials of a 5-horse power Priestman engine. Comparing the fuel consumption with that of the steam-engine, he said 1 lb. of oil might be taken as equivalent to 1¼ lbs. of coal; and, on this basis, the consumption in the oil-engine, running at full power, was equal in three trials to 1·18 lbs., 1·23 lbs., and 1·02 lbs. of coal per brake horse power per hour—a thermo-dynamic result which he regarded as remarkable. The lowest known consumption of steam in steam-engines is 12·45 lbs. per indicated horse power per hour, which corresponds to 1·61 lbs. of coal per brake horse power. The oils used in the trials were analyzed by Mr. C. J. Wilson. From these analyses, and the observations made, the following percentage values of the expenditure of heat were obtained: Heat shown on the indicator diagram, 16·12; heat rejected in jacket water, 47·54; do. in exhaust gases, 26·72; radiation and unaccounted for, 9·61—total, 99·99. The useful work at the brake was 13·31 per cent. The author compared the cost of working an oil-engine with that of steam and gas engines; and described the various applications of the oil-engine. He stated that on all occasions when he had had one under observation, it had been started without difficulty, and worked without any hitch. It appeared to require little more attention than a gas-engine.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 501.)

The Stock Markets have made some further advance in the past week in the direction of improvement. The tendency was not much marked at the opening; but, as the week went on, things generally made a brighter show. The chief feature was the improvement in Argentines and others of the same class, owing to more cheerful views being taken in regard to the threatened difficulties. Money is abundant, and the market is as easy as it well could be. The demand for high-class securities for investment continues brisk; and prices are rising accordingly. Business in the Gas Market has been very quiet, on the whole—on some days, next to nothing. Changes in quotation are few and very slight; but, such as they are, they tend downward. The Metropolitan Gas Companies remain very steady; and the strike of the Durham miners does not appear to have affected their quotations at all. Although the men have come out, many people believe that they will not remain out long, and that terms will be arranged promptly. Gaslight "A" was steadily dealt in throughout the week at 212–213½; never going outside these figures. A fair amount was done in the debenture, preference, and limited issues, and prices generally were well up to the mark; but nevertheless "C," "D," and "E" were lowered 1. A few bargains were marked in South Metropolitans early in the week, at about average figures; but afterwards they were quite neglected. Nothing at all was done in Commercials; there being apparently a great dearth of stock in the market. Suburban and Provincial Companies were quite without feature. The Crystal Palace District Company had their meeting on Friday, and voted their usual dividends. The Company have at last resolved to restore the price of gas to 2s. 9d. per 1000 cubic feet, from which they ought never to have reduced it. By coming down to half-a-crown, their earning power was enfeebled; and the profit-balance for the last half year was less than 2¾ per cent. on their capital. The result is that, although the authorized dividends only amount to an average of 7½ per cent., the payment of these swallows up the entire net revenue balance and a further £2500 out of the reserve fund. The Continental Companies continue to droop; and both Imperial and Union have lost another point. Oriental has receded ¼, which is attributable to the rate of exchange. Among the South Americans, the better feeling in Argentines has put Buenos Ayres up ½; but Monte Video has fallen to a similar extent. The Water Companies' quotations have been put down with a liberal hand; but it is not likely that much stock has been parted with.

The daily operations were: Gas was quiet on Monday; and prices closed unchanged. In Water, East London fell 4; Kent, 2½; Southwark, 2; and Grand Junction, ½. On Tuesday, the tendency in Gas was weaker. Gaslight "A," ditto "C," "D," and "E," Continental Union, and Imperial Continental fell 1 each. A further fall in Water took place. Southwark receded 4½; New River, 2½; and Lambeth and West Middlesex, 2 each. Hardly any business was done on Wednesday; but Gaslight "A" was put up 1 again. Lambeth 7½ per cent. fell 2. There was a little more activity on Thursday, but not much change. Buenos Ayres rose ½; but Oriental fell ¼. Lambeth 10 per cents fell 2. Friday was a brisker day; and prices were steady generally. The only move was a drop of ½ in Monte Video. In Water, Chelsea fell 2½; Grand Junction, 2; and East London, 1. Saturday produced no new feature in Gas. Water still fell. Chelsea receded 5; and Lambeth, 2.

ELECTRIC LIGHTING MEMORANDA.

The Dangers of Electric Light Wires—The Life and Fire Risks of Electric Lighting—The Cost of Domestic Electric Lighting—Mr. Tesla's Aims.

The new electric lighting companies have, as a rule, managed their business so much more carefully than their precursors, that they have not only avoided repetitions of those horrifying "accidents" which attended the crude performances of the early electric lighting speculators, but they have also lulled the public into forgetfulness of the danger that lies in the most innocent-looking electric light wires. We noticed not long ago, with reference to Mr. Tesla's remarkable experiments with currents of exaggerated voltage, how the irrepressible Mr. W. H. Preece had, with most unscientific special pleading, ventured to assure the newspaper-reading public that, because Mr. Tesla was not killed, therefore there is no danger whatever in high potential electricity. This particular variety of the "scientific hoax" will hardly survive the experience of the Chatham Electric Light Company, reported elsewhere. In this case, one man was killed outright, and another badly injured, by contact with a wire inside a consumer's premises. We have no desire to discuss the affair here, but simply to note the fact. The inquest was attended by Major Cardew, R.E., the electrical adviser to the Board of Trade; and the incident will therefore have its due effect at head-quarters, notwithstanding the attempts that

will in all probability be made in certain places to laugh it off, or to explain it away.

While mentioning the Chatham catastrophe, we must not overlook what transpired with reference to a similar circumstance at the recent meeting of the Bath Electric Lighting and Engineering Company. The Chairman of the Company (Lieut.-Col. Vaughton) said, in the course of his address to the shareholders, that "he regretted very much that there had been two accidents during the year. One man, after some time, was able to return to his work; but in the other case the shock to the system had been too great, and the unfortunate sufferer had succumbed to his injuries." Taking these examples of personal injury caused by electric light currents in conjunction with the other significant fact, of the fire offices having largely increased the premium charged for the insurance of the Crystal Palace during the continuance of the Electrical Exhibition, it is only reasonable to conclude that that superior "safety" which advertising electricians are in the habit of claiming for their illuminant is still a figure of speech. The action of the fire insurance companies is, as may be supposed, strongly resented by the electricians. *Industries* remarks upon the "incalculable harm" done to the electric light industry by what it calls "this ill-advised action of the insurance companies." Our contemporary, moreover, drives the lesson home itself by plaintively observing that "it is as if they (the fire offices) said that electric lighting is dangerous; whereas the whole object of the exhibition is to show that electric lighting is now practically perfect." It does not seem to occur to this writer that the insurance companies, who have to back their opinion very heavily, must be allowed to exercise their own discretion as to the degree of completeness with which this "object" of the exhibition has been attained. The less the electricians and their friends in the Press say about this matter, the better it will be for them.

A very good paper on "Domestic Electric Lighting" was recently read before the Architectural Association by Mr. Max Clarke. It was calculated to be useful not only to architects, but also to their clients, because it dealt with the elementary points of electric lighting practice in a plain, unpretentious style, and was conspicuously free from those attempts to appear clever by artful jugglery with terms of electrical measurement which too often disfigure papers of this character. Mr. Clarke's teaching is not very deep, of course; but it is perfectly trustworthy so far as it goes, which is a good deal to say. The first thing an intending user of electric light generally wants to know is what it is likely to cost him; and here comes his initial difficulty, for, unless he addresses his inquiry to the right person, he may be seriously misled. If the prospective user is a consumer of gas, and the main of a central station lighting company passes his door, he can easily procure tenders for wiring, and can ascertain the cost of the service, the charge for the meter, &c. Then if he takes the company's price for electricity per unit in pence, calls it shillings per 1000 cubic feet for gas, and increases his last year's gas bills in proportion, he will obtain a fair notion of what the electric light will cost. If the householder lives in the country, it is more difficult to institute any trustworthy comparison of the probable expense of electric lighting with the actual cost, even when known, of oil and candle lighting. Generally speaking, except in the case of a very good class of country house, where the best colza oil and wax are freely used, the oil and candles cost even less than gas, because the standard of lighting is lower. It is idle to talk about electric lighting for a country house remote from gas supply, unless the establishment is maintained upon a considerable scale. When gas-engine power is available, it may be practicable to adopt electric lighting generated by an isolated plant in substitution for oil or candles costing about £50 per annum. If steam power must be used, which means skilled attendance, it can hardly be worth while to make the experiment for a lighting bill of less than £150 per annum.

One of the best critical notices of Mr. Tesla's famous lecture upon alternate currents of high potential and frequency that has come under our observation, appeared in *Nature* over the signature "A. W. R." The writer admits that "in Mr. Tesla we have a scientific explorer, who, if health and life be granted him, will travel fast and far." It is also pointed out that Mr. Tesla's work has an object, and is not intended to end with displays of scientific fireworks. "He is one of those who hold that a phosphorescent glow is the light of the future. He hints at artificial auroræ spreading from the summits of towers of hitherto undreamt-of heights; and he has at all events got as far as producing in air, at atmospheric pressure, a glowing flame bounded by two rings about a foot and 30 inches in diameter respectively. Whether his visions will all be realized may be doubtful." Decidedly doubtful, we should say; but it is at least pleasing to have another definition of the "light of the future." There is a growing feeling that on many accounts incandescent electric lamps fall very far short of perfection. They have somehow failed to give complete satisfaction, even to those who use them constantly and like them best; while there is no gainsaying the fact that the unemotional public preserve a mortifying manner of taking them for what they are, not for what they are said to be by their makers. Shall we be quite happy when we are all able to go to bed by the light of Mr. Tesla's artificial auroræ? Perhaps so; but there is a good deal of difficult ground to be covered before that supreme result is attained.

WILLIAM THOMAS WALKER.

We regret to record the death, on the 6th inst., at Eastbourne, of Mr. William Thomas Walker, member of the well-known firm of Messrs. C. and W. Walker, of Donnington and London. He had been suffering from impaired health for upwards of a year; and his sojourn at the seaside, which commenced in November last, was with the view to its possible amelioration. The late Mr. Walker possessed exceptional ability as an engineer, had great business capacity, and was an excellent employer. In the development of the industry of gas engineering, he travelled for many years on the Continent; visiting the principal cities, and even penetrating into the heart of such countries as Spain, Egypt, Turkey, and Russia. In fact, he saw a great deal of the world; and it may be safely said that there is not a country in which gas is made where Messrs. C. and W. Walker's appliances are not to be found. This is due mainly to the extraordinary enterprise of the member of the firm who has just been removed. To his high qualities as a business man he united great amiability. An honourable, upright gentleman he endeared himself to all who knew him; and his loss will consequently be greatly felt. Mr. Walker had for a long time been associated with the Volunteer movement. He was Major of his regiment—the Highgate Volunteers; and but for his lamented decease would shortly have attained the colonelcy. His proficiency as a field officer was obtained at the School of Instruction at Aldershot. As an instance of the interest he took in military matters, it may be mentioned that, on the occasion of his visit to the Crimea in 1886, he found, near the spot where a number of officers and men of the 23rd Royal Welsh Fusiliers (the Duke of Cambridge's Own Regiment), who fell at the Battle of the Alma, were buried, a stone which had for thirty years marked their grave. When the regiment erected a handsome memorial to their former comrades, this old stone, with its rudely-carved inscription, was thrown aside. Mr. Walker brought the stone to England, and handed it over to the regiment, the officers of which had it erected in the centre of the barrack square of the regimental depôt at Wrexham. In acknowledgment, he was made a perpetual member of the mess, and was presented by the officers with a framed illuminated address, "in grateful thanks for the trouble, thoughtfulness, and great generosity displayed by him in rescuing from destruction, and presenting to them, the original stone which marked the spot where so many of their gallant comrades were laid to rest, killed at the Battle of the Alma, Crimea, 20th September, 1854." The funeral took place last Friday in Highgate Cemetery (which is in the neighbourhood of the residence of the deceased in Bishopswood Road), and was attended by the widow and family, Mr. C. C. Walker, J.P. of Shropshire and Staffordshire, and other relatives, as well as by representatives of the various departments of the firm in London and Shropshire.

THE CRYSTAL PALACE ELECTRICAL EXHIBITION.

Sixth Notice.

The present exhibition is remarkable in at least one respect—for the collection of motive machinery, mostly in action, and all of it applicable to the driving of dynamos, which is perhaps the most exacting work that can possibly be laid upon any kind of prime mover. It is well worth while, to anybody who loves an engine, to pay a visit to the so-called machine-room of the Palace; for here may be seen a goodly array of examples of the very best practice in steam and gas engine construction that the world can show. It has been our duty, as faithful critics, to publish some very sharp and sweeping censures upon much that is offered to public view as part of the latest Electrical Exhibition; and we have not hesitated to point out where, in our judgment, the electricians have gone wrong in their lighting devices, and also where they have failed to do credit to their resources and opportunities. There is nothing but praise to be given, however, for the style in which electricians and mechanical engineers have worked together at the solution of the engineering problems presented by the modern development of dynamical electricity. If there is very little Art in the Crystal Palace Exhibition, there is plenty of Science. The latter is, no doubt, the strong point of the age; and it is conspicuously the redeeming feature of this Exhibition. It is not our province to describe in detail, or to criticize, the purely electrical machinery shown at the Crystal Palace. Experts may be able to discriminate between the rival dynamos and their fittings, turned out by such leading firms as Cromptons, Siemens, Laings, &c.; but it will be sufficient to admit here that these productions are manifestly of the highest class. There is no mystery about the practice of these manufacturers. They display every detail of their work; and certainly for quality of materials and finish of manufacture there is nothing to choose between them.

Radical differences of design are, of course, noticeable in the dynamos, and in the arrangements for driving them. A really grand show, in the estimation of an engineer, is that of Messrs. Davey, Paxman, and Co., who must be credited with having from the first set the British standard of excellence in steam plant intended for electric lighting purposes at the highest

pitch attainable by materials and labour. This firm have a contract for supplying steam to the Crystal Palace Company; and accordingly they have installed in their boiler-house a row of seven 120-horse power steel boilers of the locomotive type, which furnish steam for all the engines in the exhibition. Over the boilers there is fixed a steel receiver 16 inches in diameter, into which steam from any or all of them is delivered, and from which the main steam-pipe starts. These boilers are fitted with Gresham and Craven's injectors, and there is an auxiliary duplex steam feed-pump, by Messrs. A. G. Mumford and Co., of Colchester. Messrs. Davey, Paxman, and Co.'s own show comprises, in addition to these boilers, one of their new marine type triple-expansion steam-engines, indicating 350-horse power, coupled direct to a Kapp multipolar dynamo by Johnson and Phillips, which is rated to maintain 2250 full-size 16-candle power incandescent lamps, or 250 arc lamps of 2000-candle power "actual." The dynamo supplies the incandescent lamps in the Picture Gallery, and at the same time maintains a number of Brockie-Pell and Gülcher arc lamps, and charges some accumulators. The performance of the combination leaves nothing to be desired. Its special feature is the slow speed (115 to 130 revolutions per minute) at which it is driven. The idea of the designers was to produce a motor and dynamo that could be depended upon to run for months on end without needing repairs; and so they copied the style of marine engines, which commonly drive ships many thousands of miles without stopping, and only need adjustment of their brasses at the end. The engine is fitted with a highly-sensitive governor, and can be started in any position. It is supplied with steam at 160 lbs. pressure from a new type of water-tube boiler, introduced by the firm to meet the demand for steam generators of this class. Altogether, if this plant could always be driven at something approaching a full load, it could hardly be surpassed for economy. Unfortunately, statistics having reference to central station working show that this is a very large "if" indeed.

Widely differing from the Davey-Paxman practice is that of Siemens Bros. and Co., Limited, who show a very fine array of high-speed dynamos coupled direct with Willans and Tangye engines. Messrs. Laing, Wharton, and Down also favour the Willans high-speed engine; and so to some extent do Messrs. Crompton and Co. The Brush Electrical Engineering Company have high-speed direct-coupled engines of their own; and the same may be said for Messrs. Easton and Anderson. In short, the direct-coupled engine and dynamo is a noticeable feature of the machine-room. It is evidently thought that the elimination of the belt removes one source of danger of break-down; but it by no means follows that there is no such risk in the case of direct-coupled plants. There have been several wholesale extinctions of the Palace lighting since the exhibition was opened; and we understand that the honours for these illustrations of the uncertainty of all arc lighting are divided between the belt and the direct-driving plants. It has been declared by respectable authorities on the subject, that the modern English form of electrical generating plant is the directly-coupled high-speed engine and dynamo; and that the slow-running horizontal condensing engine, such as the Galloway engine belonging to the Palace Company, and used for years in their lighting service, is obsolete for this purpose. Precisely how much justification there may be for this view we cannot pretend to say; but it is significant that a firm of such experience and standing as Messrs. Siemens Bros., to say nothing of the others, are content to be identified with this principle.

The most interesting class of machinery exhibits to gas engineers will naturally be the gas-engines; and of these there is a particularly large and representative collection. Notice must, in the first place, be taken of the Crossley exhibit, which is not so large as might have been expected; but this may be explained by reference to other specimens of this firm's engines to be found scattered over the exhibition. Several examples of the newest patterns of "Otto" engines, with the latest improvements for igniting the charge, preventing the engine starting backwards, &c., are shown on stand No. 44. The makers do not pretend to compare their productions with those of their rivals; but they have signalized the expiration of their monopoly by lowering their prices, and point to their 20 years' experience and experiments as constituting sufficient reasons why they should retain the patronage of power users. Some arc lamps are being supplied satisfactorily from the Crossley stand. It should be remarked here that many exhibitors of gas-engines work in conjunction with exhibitors of electric light and fittings, and advertise the combination, by which arrangement it is rendered possible to see what this kind of power is capable of doing. We have no hesitation in stating that the supply of arc light from gas-engine driven dynamos is generally a success. In one or two instances incandescent lamps are also well maintained by gas-engines; but this is a very much more trying performance. When a number of incandescent lamps supplied by a gas-driven dynamo are collected together, the slightest pulsation is faithfully indicated by the lamps, which are, in fact, extremely sensitive instruments for this purpose. There has been some talk of a competitive trial of gas-engines in connection with the exhibition; but we hardly expect makers to submit to anything of the kind. The two common devices for correcting the irregularities of gas-engines, and preventing their affecting incandescent lamps, are heavy fly-wheels—a pair of them to every engine—and a belt not too tight. These "dodges" are very transparent, however, and condemn those who place too great reliance upon them.

The gas-engine exhibit of next importance to Messrs. Crossley's is that of the "Campbell" Company, of Halifax; but that of the "Stockport" engines is not far behind. A "Stockport" 6-horse power engine is employed by Messrs. Barclay and Son to generate current for their model country-house plant on the Scott-Sisling system, which involves the use of accumulators, and is a good specimen of what can be done in this way. The Stockport engines are not new, but, like others of their class, the makers are constantly improving them. The reason they have been patronized by Messrs. Barclay and Son is their ease of starting, which is effected by an ingenious new device. The Campbell engines are likewise well known, and are recommended on account of their simplicity of parts, efficiency, and regularity of movement. "Griffin" gas-engines are shown by Messrs. Dick, Kerr, and Co., Limited, of Kilmarnock. These engines run with great regularity, and are made in large sizes as well as in small patterns.

The ingenious Atkinson "Cycle" engines are shown; claiming respect as usual for their economical working, while attracting notice by their uncommon appearance. The "Trusty" engines of Messrs. Weyman and Co., Limited, of Guildford (Surrey), use the "Otto" cycle, and are well made machines. Day's patent vertical engine is a comparatively new-comer in the field. It is made by Messrs. Day and Co., of Bath, and is a neat, workman-like looking engine. The "Fielding" gas-engine, by Messrs. Fielding and Platt, of Gloucester, is another of the rival "Otto" type machines, appealing to power users upon the usual grounds. The "Trent" engine is shown by the manufacturing Company of the same name, whose works are at New Basford, Nottingham. Another Nottingham specialty of the same kind is the "Premier" engine, made by Messrs. Wells Bros., of Sandiacre; which is also upon the "Otto" or Beau de Rochas principle. A new production under a somewhat hackneyed name is the "Acme" engine (M'Gee and Burt's patent) shown by Messrs. A. Burt and Co.; while the "Capitaine" patent gas and oil engine shown at stand No. 53 is unique.

Enough has been stated to indicate the importance of the gas-engine exhibits at the Palace. If we do not describe these machines minutely, it is because some of the best of them are old friends of our readers, and it is impossible to explain the points of such motors in letterpress. We are deliberately of opinion that, in some makes of the cheaper gas-engines now coming into the market, finish is being sacrificed to cheapness; which is a mistake that will bring its own punishment in the long run. Also there is too much fly-wheel about many of these engines. It may be vain to look for a higher duty from the gas consumed for motive power until the hot-cylinder engine or some kind of gas turbine motor appears; but regularity of revolution and the reduction of internal friction will occupy gas-engine designers for some time to come, and prices are very unsettled. There is no appearance of any tendency on the part of electricians to neglect the gas-engine as a convenient source of power; indeed, the evidence points the other way. We confess, however, that we should have been better pleased with the gas-engine people if they had shown more enterprise in connection with this exhibition. Engines of from 2 to 16 horse power nominal are well enough, so far as they go; but why was not the opportunity taken of showing what can be done upon a larger scale? Where is the 100-horse power engine, using Dowson gas, that we have read about? For all that can be learnt at the exhibition, it would appear that the efficiency of the gas-engine ends just where that of the steam-engine begins—that is, at a motor of about 50-horse power. But this is just where we were ten years ago; and here we seem to stick.

Death of Mr. T. Mahony, of Cork.—We regret to record the death, on Monday last week, at his residence at Blackrock, of Mr. Timothy Mahony, J.P., the Chairman of the Cork Gas Consumers' Company. Our readers may remember that only about a fortnight ago Mr. Mahony presided at the meeting of the Company; and therefore his removal has been sudden. In fact, he was in his usual health last Sunday week; but early on the following morning, he was seized with slight hemorrhage, which was followed by syncope—death resulting from failure of the heart's action. The deceased gentleman succeeded Mr. J. F. Maguire, M.P., in the chairmanship of the Gas Company; and he was also a Director of the Passage Railway Company and of the Macroom Railway Company, as well as associated with other undertakings. He was at the head of the firm of Messrs. Martin Mahony and Sons, woollen manufacturers, who were the first to commence the production of tweeds in Ireland. From a small beginning, the concern has become one of the most important in Cork—employing many hundred hands. Mr. Mahony was, from its foundation, an active member of the Society of St. Vincent de Paul, and was finally its President; and it may justly be said that he took part in all movements calculated to benefit his fellow-creatures. At the meeting of the Corporation on the day of his decease, a resolution was passed expressing the profound regret of the members at the loss of a highly-esteemed citizen and a distinguished philanthropist, and their sympathy and condolence with his family in their bereavement.

NOTES.

Lord Rayleigh on Heat-Engines.

Lord Rayleigh's suggestion for improving the efficiency of steam-engines by raising the temperature of the water in the boiler by the addition of saline substances, which was the subject of a "Note" in the JOURNAL for the 1st inst., has been criticized by several writers in *Nature*, and in particular by the well-known marine engineer, Mr. J. Macfarlane Gray. Mr. Gray supports the view that superheating steam is of little service; proving that "less than 4 per cent. is gained by superheating 200°." But he vehemently contradicts Lord Rayleigh's astounding announcement that, by the addition of saline matters to water in boilers, the possible efficiency, according to Carnot, may be increased. Mr. Gray asserts that there would be no gain from superheating by a saline solution, over the usual method of superheating steam raised from pure water. It is not the saline mixture, but the steam, which is the working substance; so that the efficiency would be precisely the same, whether or not a salt is dissolved in the water from which the steam is derived. The plan foreshadowed by Lord Rayleigh was patented by Mr. S. Geoghegan some ten years ago. Mr. James H. Cotterill admits that there is a gain by superheating; but, putting aside cylinder condensation, the gain is small. He remarks that superheating was originally introduced with the object of drying the steam and diminishing cylinder condensation; and he thinks that, now that the difficulties attending its use have been in great measure removed by the lubrication of cylinders by mineral oil, it is hoped that the practice may be revived.

Magnetic Iron Rust.

At the recent meeting at Hobart, Tasmania, of the Australasian Association for the Advancement of Science, Professor Liversidge, F.R.S., of the University of Sydney, read a suggestive paper on the rusting of iron. The author remarked that in books upon chemistry it is usually stated that iron rust is composed of the hydrated sesquioxide of iron; but on examining a very large number of specimens of rust from many different places, and from iron articles of various kinds, and formed under very varied conditions, Professor Liversidge has found that in almost every instance the rust contained more or less magnetic oxide. Indeed, in some cases the rust, although presenting the usual rust-brown colour and appearance, was, when powdered, practically altogether attracted by the magnet. The specimens of rust which first drew the author's attention to this subject were large rust scales obtained from some old tramway metals, which he was led to collect and examine on account of their resemblance to the crust so often present upon metallic meteorites. On crushing these scales in a porcelain mortar, and testing the dust with a magnet, it was found to be wholly susceptible to magnetism, owing to the small quantity of magnetic oxide present being mechanically enclosed in the rust particles. The production of this magnetic oxide does not seem to have been due to the presence of mill scale, because, when bright iron wire, plates, rods, nails, &c., were artificially rusted in many ways with free access of oxygen, in almost every instance a large amount of magnetic oxide was formed. These observations have some practical bearing upon the problem of the preservation of wrought-iron structures from rust.

The Ventilation of the Sorbonne.

According to the report of the Sanitary Commission of the *Lancet*, one of the most perfect examples of ventilation of a public building in the world is the new Sorbonne amphitheatre, used for all the great ceremonies in connection with the Paris University. The building is of the nature of a theatre, only with a platform in place of a stage, and with all the seats of equal grade. The plan of the interior is, however, practically like that of a theatre, and the principles of warming and ventilation adopted are the same as have been applied to the new Vienna Opera House. The air is admitted into the hall by openings under every seat—indeed, all the seats are fixed upon air chambers. The air is propelled into the building by three fans placed side by side in the intake; and a portion of it can be diverted, by means of a valve, to a warming-furnace, while the rest passes on—both currents, however, mixing before entering the house, so that the temperature is fully under the control of the attendants. The rate of intake provides for a normal supply of 20 cubic metres of fresh air per head per hour, calculated on the seat capacity of the house; but by hard driving the supply can be considerably increased. The motive power for the fans is a 15-horse gas-engine. In summer the entering air can be washed and cooled by a water-spray. The inlets under the seats are covered with perforated baffle-plates, so as to render the current of air imperceptible. The outlets measure rather more than one-half of the collective area of the inlets. They are situated in the roof of the hall, and under the galleries. Gas-burners help to draw up the vitiated air until it reaches the final outlet-shaft, through which the air passes at a calculated rate of 1·20 metres per second. It has not been found necessary to place an exhaust-fan in this outlet-shaft. By a refinement of design found nowhere else, means are provided for turning the whole power of the heating-furnaces upon the walls, seats, &c., of the amphitheatre for an hour or so before the time fixed for a meeting. The temperature of the whole interior is raised to 160° Fahr., until the inner surfaces have absorbed a store of heat, when cold fresh air is again turned on, so that the company have the luxury of a warm building with an atmosphere as cool as that outside. The gas that lights the amphitheatre is burnt above a glass false roof; and its heat only tends to drive out the foul air faster.

TECHNICAL RECORD.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Annual Meeting of this Association was held last Wednesday, at the Holborn Restaurant, High Holborn, under the presidency of Mr. A. DOUGALL, of Tunbridge Wells. There was a fair muster of members; and several friends were also present.

The usual formal business first engaged attention.

MINUTES OF LAST MEETING.

The minutes of the meeting held in November of last year were taken as read.

REPORT OF THE COMMITTEE.

The HON. SECRETARY (Mr. J. W. Helps, of Croydon) then read the following report:—

The Committee, in submitting the seventeenth annual report, have pleasure in stating that the Association continues in a flourishing condition. It is to be regretted that three members have been lost by death during the past year—viz., Mr. John Chapman, of Harrow (a member since 1877); Mr. F. M. Edwards, of St. Mary Cray; and Mr. C. King, of High Wycombe. The latter gentlemen were elected in February, 1891. Three members have resigned—making a total loss of six. In the same period, six new members have been elected; leaving the total number 88—the same as last year.

The usual number of meetings have been held. At the February meeting, Mr. John Methven, of Beckton and Nine Elms, gave an eminently practical Inaugural Address; and it becomes a valuable contribution to the recorded proceedings of the Association. At the summer meeting in May, a pleasant excursion was made to Windsor. Mr. Methven kindly provided the luncheon, after which the gas-works were visited—Mr. J. Wadeson, the Manager, giving every assistance in looking over the various parts of the works. The members then proceeded to the Castle and grounds, under the guidance of Messrs. J. Wadeson, Strange, and Wadeson, jun. A drive through the Great Park to Virginia Water and back, completed the day's enjoyment. The party afterwards dined together at the Star and Garter Hotel, Windsor. The third meeting, in November, was held at the Holborn Restaurant; and two excellent papers were read. Mr. J. Tysoe, of East Greenwich, gave his experiences with stoking by the aid of machinery, and an interesting discussion resulted. Mr. R. Herring, of Dover, read a paper "On a Rapid Means of Increasing the Yield of Gas from Ordinary Retort-Settings," which was received with the attention the subject deserves.

The funds of the Association are still in a healthy state. The total receipts for 1891 amounted to £48 4s., and the expenditure to £47 12s. 9d.; leaving a balance to be carried forward of £42 10s. 4d., against £41 19s. 1d. in 1890. Under these circumstances, the Committee are glad to be able to send to the members, as in previous years, a copy of the "Reports of District Associations."

Our esteemed Hon. Secretary (Mr. James W. Helps) has again been active in forwarding the interests of the Association; and the Committee readily acknowledge the indebtedness of the members to Mr. Helps for his valuable services.

Mr. E. Price has resigned the position of Auditor, which he has held for many years with credit to the Association. Mr. W. H. H. Broadberry has been appointed, and has kindly consented to fill the vacancy.

Messrs. C. Gandon and H. G. Mitchell have been elected to the Committee, to fill the places of those retiring by rotation.

With the assistance and co-operation of the members, the Southern District Association has a progressive future of usefulness before it; and this, coupled with the feeling of friendship which exists between the members, adds to the enjoyment of all, while assisting in the imparting of valuable knowledge relating to the important industry the Association represents.

On the proposition of the PRESIDENT, seconded by Mr. J. THORMAN (West Ham), the report was unanimously adopted.

THE EX-PRESIDENT.

The PRESIDENT said he had now a very pleasing duty to perform, and one he was sure which would meet with the hearty approval of all the members. It was to propose a vote of thanks to the retiring President (Mr. John Methven), who had occupied the position with conspicuous ability and dignity, and had done much to further the objects of the Association. It was unnecessary for him to enumerate the great services he had rendered—not only in presiding so ably over their deliberations, but also in giving to the members the results of his experience in the matters under discussion during the year.

Mr. W. D. CHILD (Romford) seconded the motion, which was cordially agreed to.

Mr. METHVEN said he was much obliged to the members for the manifestation of approval that they had accorded to his humble endeavours to carry out the duties of the office of President. It had been a source of gratification to him; and, although he congratulated them in now having a very worthy occupant of the chair, he left it with feelings of regret.

NEW MEMBERS.

On the motion of the PRESIDENT, seconded by Mr. W. H. H. BROADBERRY (Tottenham), the following gentlemen who had been nominated for membership were elected: Mr. F. W. Thurlow, Secretary and Manager of the High Wycombe Gas Company; Mr. A. W. Archer, Manager of the Enfield Gas-Works, Ponders End; Mr. W. A. Walker, Engineer of the

Worthing Gas Company; and Mr. G. F. Marsh, Secretary and Manager of the Buckingham Gas Company.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Allow me, gentlemen, at the outset of this address, to thank you heartily for the honour you have conferred upon me in electing me to be your President. I must confess that I feel the responsibility attached to the position to be very great; and it was only after much hesitation that I accepted the presidency—feeling, as I did, how difficult it would be for one of the younger members of the Association to maintain its character, especially in view of the fact that I am called to follow in the steps of a gentleman of such wide experience and such high attainments as our late President.

In addressing you to-day, I am quite aware that I cannot say anything that will possess any special feature of novelty or of extraordinary interest; but I trust you will follow me with some degree of interest while I deal briefly with a few matters which have come within the range of my own experience.

It is gratifying to remember that at no period in its history has the gas-producing industry experienced a retrograde movement so far as increase in business is concerned, but that steady progression has ever been its characteristic feature. This satisfactory state of affairs has not been merely such as we might naturally expect from the increase in the population, but has been due to the growing desire for more light, and to the fact that gas has been gradually displacing other illuminants. Gas having found an entrance as an illuminant into most houses, except those of the working classes, it might have been expected that the large increases in its consumption would ere this have stopped, and that we should have had to be content with merely maintaining our position. But, far from this being the case, there has been a continued and steady rise in the figures registered by our meters. Take for example Tunbridge Wells, which has no abnormal record to show. During the last decade the population increased 14·75 per cent.; the gas consumers, 21·16 per cent.; the gas consumed, 66·84 per cent.; and the increase per consumer, 38 per cent.

The value of gas as a heating agent has long been acknowledged; but there was little chance of much progress in that direction as long as it remained at high prices. On the gas engineer therefore rested the responsibility of so cheapening it that it should be available for heating as well as lighting purposes; and to this end many of the ablest men in our profession have been, and are still, devoting their best energies. Improvements in the construction of new works, in the manufacture and distribution of gas, and in the general management of our undertakings, have done much to cheapen and popularize gas; and, as a consequence, it is being applied to all sorts of purposes where heat is required. Great as the increase has been in the past, I do not think there was ever a period in the history of our industry when purveyors of gas might more hopefully anticipate a large increase than at the present time. The multifarious uses to which it can be applied (for warming, for cooking, and as a motive power) have called into existence entirely new industries to provide expedients for its economical consumption. I have made very careful inquiry in my own district, with a view to ascertain what scope yet remains for the application of gas; and find we have 5300 inhabited houses—2375 consuming gas and 2925 using other illuminants. The quantity of oil used in our district last year was 121,400 gallons; and if we take 3 gallons to be equal to 1000 cubic feet of gas, we may reckon that gas is supplying four-fifths and oil one-fifth of the requirements for illuminating and heating purposes. As regards gas as a fuel—that is, as a heat producer—the field is much wider. Although Tunbridge Wells, being purely a residential town, does not offer the advantages of a business town to the many and varied applications of gas, still during last year, for domestic purposes alone, there were used, in addition to 8000 tons of coke, about 44,400 tons of coal, or nearly three times the amount used for making gas. Thus, notwithstanding the fact that we have 1304 stoves of various kinds in use in our district, it would appear we have scarcely entered on the field open to us. In most other towns, the possibilities in this direction are much greater, and afford scope for a marvellous development.

The process of carbonization has engaged a great deal of attention in recent years; and as the outcome of such labours, the system of direct firing is being gradually displaced by the more scientific method of gaseous firing. It is now no longer necessary to go to great expense in order to secure the advantages of this mode of firing, as the process has been much simplified in the light of modern knowledge and experience. In the year 1887, an installation of 16 conservator furnaces, to the design of our esteemed Past-President Mr. Valon, was brought into action at Tunbridge Wells. The retorts are Ω-shaped, 21 inches by 15½ inches, and were first arranged with seven in a bed. It was, however, found expedient to remove the middle retort, on account of local heating; and a combustion chamber was formed the full length of the setting. The furnace arch has nostrils, four on each side, and an air channel along the crown between the nostrils, with holes opposite to them through which heated air is supplied to consume the carbonic oxide. The air is heated by passing backwards and forwards along the sides of the furnace; and the arch over the furnace is cast as low down as possible. In this way, the bottom retorts get a fair share of the heat by conduction through the walls of the retorts in immediate proximity to the burners. Those who have devoted much attention to the application of fuel in the gaseous form, have experienced more difficulty in properly distributing the intense heat than in constructing efficient generators. But by this arrangement no local heating is experienced; each retort is evenly heated throughout, and carbonizes the same weight of coal. Some of the retorts that were brought into action in the year 1887 are still in use, having been in actual work upwards of 1000 days.

I have lately given up the employment of steam for the generator furnaces, and have adopted ash-pans supplied with water which first trickles down trays of breeze placed in front of the coke. The change became imperative, on account of the enormous amount of steam required to keep the brickwork cool, and to prevent fusion of the ash. A moderate estimate of the coke required daily to raise steam for the supply of one furnace is 1½ cwt., which amounts to something considerable in a year. It must be remembered, however, that I was working under exceptional conditions, having to deal with coke made from limed coal; and the difficulty was increased by the fact that it was necessary at times to use more than the orthodox 2½ per cent. of lime. I may say that the presence of lime in coke for heating retorts is in no way objectionable where generator furnaces are employed, if careful attention is paid to the steam supply, and if the furnaces are occasionally pricked up in the usual way. The slow initial draught at which such furnaces are worked, and the precautions that are taken in clinkering, by using false bars to keep the coke *in situ*, prevent to a very great extent the lime from getting into the setting and fusing the brickwork. Each setting has its own independent furnace clinkered regularly every twelve hours. The operation is performed without the admission of cold air to the setting; and it is done so expeditiously that I do not think I should gain much by cleaning out less frequently. The furnace doors we use at present are home-made; and although not absolutely tight, they answer the purpose very well where there is so little heat. A sheet of iron, No. 6 gauge, slides in a frame made of 1½ inch by ⅜ inch iron, and is actuated by a counterbalance weight. This door is fitted with a slide for the admission of primary air. In the second half of our retort-house, where the ordinary settings are converted into shallow generators worked from the retort-house floor, a different arrangement is in use. The furnaces are 3 feet deep, and have a door at the top for charging and another at the bottom for clinkering. These doors are placed on a hollow frame provided with slides, through which the secondary air is admitted, and passes down to flues running along the sides of the furnace, and then rises to meet the carbonic oxide at the openings in the furnace arch. These shallow furnaces are not quite so economical in fuel as the larger and deeper ones; but they can be worked at a low initial draught, and the same advantages of freedom from deposit in the setting, uniform heats, and durability of retorts are in a great measure obtained. Speaking generally of gaseous firing, the facility with which the heat can be regulated to the various kinds of coal used is a great advance upon the older system. This facility, however, is not without some drawbacks; and if we are not careful, the heat will get too high, and as a natural consequence stopped pipes will abound.

The question of mechanical stoking is one which has occupied a good deal of the attention of this and other Associations during the past year. My own experience has been with West's manual machinery, of which I cannot speak too highly. Apart altogether from economy, it possesses the great advantage of simplicity, and performs the work with constancy and greater expedition than by scoop or shovel. You may take a man quite unaccustomed to retort-house work, and after very little instruction entrust him with the charging of the retorts; and he will find no difficulty in carrying out the work satisfactorily. We have for the last twelve years depended entirely upon this machinery in the retort-house, and have never experienced any serious inconvenience through a breakdown. We, however, take the precautionary measure of periodically inspecting the machinery; and every Friday, whether it requires it or not, a careful examination is made by a mechanic, and in this way inconvenience is often averted. With mechanical stoking, I have found it desirable to work single retorts. Where the charges come together in the middle of the retorts, it is a difficult matter to deposit the full quantity of coal; and I have invariably found an increase in the trouble of stopped ascension-pipes. A 9-inch block dividing the retort in the centre meets the case; and if it has a hole filled up with loam and ashes, when scurfing has to be done the stopping is easily knocked out, and the retort cleaned almost with the facility of a through one.

The question of how soon the tar and gas should be separated, is one upon which opinions differ. Some engineers prefer to separate them as early as possible—say, before the temperature gets lower than 130° Fahr.; while others allow them to remain together until the temperature has been gradually lowered. In this case, where gas is slowly condensed in the presence of the tar, there is a very marked freedom from naphthalene deposits, both on the works and in the district. But this immunity is only obtained at the expense of illuminating power; and I take it that our aim should be to retain by every possible means this illuminant in the gas. At Tunbridge Wells, the Livesey and

Tanner tar and liquor overflows have been in use in all the hydraulic mains for some years. This ingenious arrangement is well known to you; and I need only say that by means of it the tar and liquor are separated in the hydraulic main, and a seal secured at all times in liquor and not tar. Each hydraulic main becomes a washer—the perforated plate breaks up the tarry globules as they pass through it; and I find that about nine-tenths of the tar is extracted in this way. This is conducted in an independent pipe straight to the storeage tanks; and by the separation at this early stage, we gain three-quarters of a candle in illuminating power, which has enabled us to abolish the use of cannel. On the side of each main a casting is fixed, having a window through which the tar and liquor can be distinctly seen. Working with high heats, I find it necessary to run a small quantity of tar out of each main daily; and for this purpose a 2-inch cock is fixed in the bottom of each, immediately under the tar outlet. Thus any thick tar that might otherwise obstruct the flow is readily removed. With this precaution, the apparatus works very well indeed.

In the year 1881, the late Mr. R. P. Spice read a paper before the members of the British Association of Gas Managers on the St. John's apparatus, and its application at the gas-works of the Rochdale Corporation; and in the year 1882, on his recommendation, one was erected at Tunbridge Wells, for the purpose of preventing the deposit of naphthalene. In that respect it was, in a measure, successful. My results, however, so far as illuminating power was concerned, did not agree with those obtained at Rochdale, where cannel coal was largely employed; for, instead of getting an increase, there was a distinct reduction. May not this point to the fact that, while it is a decided advantage, when using one class of coal, to separate the tar and gas as early as possible, with another class it may be advantageous to keep them together for a longer period?

Until recently, the steam-jet exhauster had been in continuous operation at Tunbridge Wells for eleven years. It possesses many advantages—requiring no lubrication, and very little attention, being silent in action, and maintaining a perfectly steady gauge. But, on the other hand, a larger quantity of steam is required to work it; and it is often accompanied by a serious deposit of naphthalene. In our case, the exhauster was placed immediately after the St. John's apparatus, and before the condensers. The gas entered at a temperature of 90° Fahr., and was raised to 160° Fahr. by the steam. It was no unusual thing to have to clean out the condensers every month during the winter; but having them in duplicate, it was a comparatively easy matter as long as the deposit was confined to the condensers, and did not extend to the connections beyond. The condensers in question are horizontal, and consist of fourteen lengths, each having an inclination downwards; and the deposit was removed by means of steam. The naphthalene was easily dissolved, and, being kept warm, ran out at the bottom in a thick fluid, which soon solidified, and separated from the condensed steam. When the steam-jet exhauster is placed after the purifiers, and a second condenser is employed, no trouble, I am told, is experienced from naphthalene. This knowledge, however, was not enough to induce me to continue the use of the steam-jet; and in the year 1889, when it became necessary to increase the exhausting plant, the steam-jet was abandoned, and a Donkin exhauster substituted.

The various methods of effecting the purification of gas, with special regard to the removal of the sulphur compounds, I shall not refer to, further than to recount my own experiences. As most of you are aware, the coal-liming process was in continuous operation at Tunbridge Wells for many years; and although volumes have been written on this subject, you will perhaps pardon me for referring to it now. In the "Gas Engineer's Chemical Manual," Professor Wanklyn says: "If coal-liming were perfectly carried out, the gas passing up the ascension-pipe out of the retort would be quite free from sulphur in every shape." How much can be realized in actual working is quite another matter. When the lime and coal are thoroughly mixed, so as to obtain the most intimate contact practicable, the effect produced on the crude gas at the entrance to the purifiers is a reduction of about 350 grains of sulphuretted hydrogen, and 16 grains of sulphur compounds; the carbonic acid remaining about the same as in the ordinary process. My experience with various kinds of coal justifies me in giving these figures as the result that may be expected from this process, whatever kind of coal is used. Take for example a coal yielding, under ordinary treatment, a gas containing at the inlet to the purifiers 600 grains of sulphuretted hydrogen, and 28 grains of sulphur compounds, the effect of liming this coal would be to reduce the sulphuretted hydrogen to 250 grains, and the sulphur compounds to 12 grains. If, however, the coal to be operated upon contains 1200 grains of sulphuretted hydrogen, and 45 grains of sulphur compounds, the result is very different, as, when the lime has done its work, there will still be 850 grains of sulphuretted hydrogen, and 29 grains of sulphur compounds, in the crude gas at the entrance to the purifiers. In the first instance, the crude gas from the limed coal is specially amenable to treatment by air; 1 per cent. being sufficient to consume the whole of the sulphuretted hydrogen, and keep the purifiers (in which no lime was used, but oxide only) in active operation for more than a year without raising a cover—the sulphur compounds being well within the usual limits. In the second example, Cooper's process is quite inadequate to deal with the conditions. Had that process been equally applicable to all kinds of coals, there is no doubt coal-liming would have been very generally adopted.

When we gave up coal-liming, about a year ago, lime had, of course, to be used in the purifiers, to keep the sulphur compounds within the statutory limit of 20 grains. We have six purifiers, each 20 feet square, four of which are charged with lime, and work in rotation, while the other two contain oxide. About 2 per cent. of air is admitted to the purifiers through a meter; and this, together with what unavoidably gains admission up the ascension-pipes, is sufficient to oxygenate the lime. The crude gas at the inlet to our purifiers contains, on an average, 680 grains of sulphuretted hydrogen, 800 grains of carbonic acid, and 30 grains of sulphur compounds; and we employ lime of 86 per cent. causticity. When the gas is passing through the purifiers at about the rate of 30 feet per square foot per hour, it only requires two yards of lime to purify a million cubic feet of gas; but when the rate increases, as it does in my case, to 90 feet per square foot per hour, it requires 2½ yards. With larger purifiers, or if pure oxygen were used instead of air, this increase would not take place. This system has the recommendation of simplicity. We find no difficulty in keeping the sulphur compounds at about 10 grains (the average for the year being 9·40 grains); and when the spent lime is removed, there is no objectionable smell from it.

The last gasholder erected at Tunbridge Wells has Cutler's patent guide-framing, recommended by the late Mr. Spice, whose lamented death occurred soon after the work was commenced. The principle, so far as I am able to judge, is good; consisting as it does of a braced framework of cylindrical form, in which every member is doing useful work. In his desire to be on the safe side, the patentee has certainly put into our guide-framing a great deal more metal than is necessary; but as it was the first erected according to his patent, this excess is, I think, pardonable. I hope later on you will have an opportunity of inspecting the structure for yourselves.

Before leaving this subject, there is one thing I should like to draw attention to, and that is the desirability of having some arrangement to prevent the possibility of interruption to the supply of gas through a workman closing the wrong valve. I speak feelingly in the matter, as on one occasion we unfortunately had our town in partial darkness through a mistake of this sort. But I have since averted all danger on this score by introducing, between the inlet and the outlet of our gasholders, one of Messrs. W. and B. Cowan's safety or bye-pass governors, so adjusted that it will open when the pressure at its outlet falls below that of our lightest gasholder.

As the demand for broken coke increases year by year, the question of how to dispose of the breeze to advantage naturally engages more attention. Where generator furnaces are in operation, a good deal of coke breeze can be used up; and several furnaces—notably the "Perret" and the "Meldrum"—have been invented to utilize breeze for raising steam, and have deservedly found favour. I have not had any personal experience of these furnaces; but I have often seen them at work, and have heard them spoken of very highly. So far I have been able to use up all our surplus breeze in the boiler furnaces by a simple arrangement of the fire-bars. Our boilers are of the Lancashire type, 7 feet in diameter and 24 feet long. The area of each grate is 16 superficial feet; and the bars are ½ inch thick, with a windage of ¼ inch. With this arrangement, there is no difficulty in burning coke breeze, either alone or on the top of a layer of coke; but, of course, this plan would not answer if the area of the grate were much less than that I have just given.

The manufacture of sulphate of ammonia is a process which is now conducted at most gas-works. There are in the market many admirable plants by which this work can be efficiently and economically carried on. The apparatus known as the "close saturator and open evaporator process" of the original Abbott type was in operation at Tunbridge Wells for many years, producing a beautifully white salt, which generally contained 25 per cent. of ammonia. The process, however, was slow and extravagant in fuel; and some years ago I introduced, as a temporary device, a tube 3 feet in diameter by 20 feet high, filled with thin bricks laid on edge, with a space of an inch between, each layer being placed crosswise. This made a very good still for the elimination of the *free* ammonia. The liquor was pumped on to a dash-plate; having been heated on its way by the fumes from the saturator. The liquor passed down this still, then through the Abbott stills, where it was treated with cream of lime, and escaped through syphons to the settling-tanks. This expedited the work very much, and made the process continuous, so far as the distillation was concerned. The evaporation, however, was slow, and required much steam; but I found great advantage by a simple alteration suggested to me. It consisted in sloping the sides of the pan towards the centre, and placing the pipes near the top on brackets instead of at the bottom. By applying the heat near the surface, evaporation takes place more quickly, and the pipes are kept free from the salt. We have now replaced the "close saturator and open evaporator" by Dr. Feldmann's apparatus, which is more economical; and it is well known that an exceedingly good sulphate of ammonia can be obtained from common pyrites acid by the direct process—the ammoniacal gases being brought into the saturator as warm as possible. I have found it an

advantage to have the lime to be used in the stills occasionally slaked with the spent liquor, not as a substitute for the laboratory test, but as a ready and forcible means of revealing the state of the liquor to the man in charge.

The distribution department, I am sure you will all agree with me, is one of growing importance. Much has been done in the past, by skill and careful supervision, to reduce the leakage, or unaccounted-for gas, and with very great success. The many uses to which gas is applied make it necessary to devote more attention to this department, so that our consumers may secure an ample supply, and use it under the best conditions. The question of pressure is one of great moment to purveyors of gas, as well as to the consumers generally; and to secure the nearest possible approach to uniformity, engineers have resorted to various methods. Many of us who have undulating districts adopt the system of zones controlled by separate governors, and, where the works are not at the lowest level, carry the gas through a trunk main to that point before distributing. But even then some parts must necessarily be supplied at excessive pressures; and it behoves us to do all in our power to acquaint our consumers with the importance of regulating the pressure at the point of ignition, and to place within their reach suitable burners at the most reasonable prices.

It is now as necessary to have our show-room for stoves, cookers, and other appliances as to have an office in the town; and if this room is heated, lighted, and ventilated by gas in the most approved manner, it will not fail to impress those who enter it, and will do much to break down the prejudice which still exists in some minds against the use of gas for such purposes as those I have just indicated. The show-room should also be provided with means for demonstrating the influence of pressure upon the lighting power, and with the various burners and globes recommended. The articles should be sold at the lowest possible price either by the gas company or some accredited agent in the town. The latter is the plan just adopted at Tunbridge Wells. We send a man to fix the burners and globes free of charge; and, by means of this introduction to the house, he is often able to make suggestions with a view to improve the existing arrangements, and so give greater satisfaction generally. There is no doubt that excessive pressures at the point of ignition, by destroying the illuminating power and needlessly vitiating the atmosphere, give rise to many complaints; and I take it that it is our duty to do all in our power to prevent this by recommending the use of self-regulating burners. Here the difficulty of price comes in. While some consumers are willing to pay 1s. or 1s. 3d. each for such burners, many hesitate to do so; and the want of a cheaper form of automatic burner has long been felt. There is another thing which militates against the progress of gas, and which unfortunately in most cases is not under the control of gas companies or corporations. I refer to the internal fittings. It is much to be desired that the builders in our respective towns should adopt a standard size of fittings approved of by the gas authorities. I know this is a difficult thing to bring about; but the difficulty is surely not insuperable.

Gentlemen, we stand confronted at the present time with two rivals of a more or less formidable nature—oil and electricity. Petroleum at popular prices is a powerful competitor with gas. The improvements which have taken place in oil-lamps, both as regards their efficiency, safety, artistic appearance and cheapness, have certainly brought oil not only into more general favour as a supplementary agent to gas in shops, but these lamps of beautiful design are superseding gas in many drawing-rooms. It is a popular notion that the atmosphere of a room is more healthy where oil is used than where gas is employed. Of course, the degree of vitiation of the atmosphere by oil and gas respectively was settled long ago by the late Dr. Letheby; but in spite of that, we are constantly being met with the assertion that oil is a more healthy means of illumination. This is doubtless owing in a great measure to the fact that, when oil is used, a large part of the room remains in semi-darkness; whereas when gas is employed more light is made use of, and the whole of the room is illuminated. I have examined the various kinds of oil used in my own district, with a view of ascertaining the amount of sulphur given off in combustion as compared with gas. The oil was burnt in the Referees sulphur apparatus, and treated in exactly the same way as prescribed for gas. Comparing them on their relative illuminating value, the following are the results, taking 52·5 grains of oil as equivalent to 1-candle power per hour, and 1 cubic foot of gas as equal to 3·2 candles per hour:—

Petroleum Oils.

Sample No.	Retail Price per Gallon.	Sulphur in Oil equal to 100 Cubic Feet of 16-Candle Gas.
	s. d.	Grains.
1	0 8	5·04
2	0 10	2·52
3	1 2	2·35
4	1 2	2·30
5	1 3	1·68
6	1 6	3·36

Paraffin Oils.

1	0 8	6·72
2	0 10	4·03
3	1 0	2·35
4	1 2	3·86

These results show the oils to be very pure so far as sulphur is concerned; and it behoves us to see that the sulphur compounds in our gas are kept well under. I cannot, however, believe that 10 or 12 grains can have any appreciable effect on the atmosphere of a room.

A word about the electric light. It will be within the recollection of all here with what a flourish of trumpets the telegraphic announcement was made of an important discovery by Edison in connection with the sub-division of the electric light. Then followed the promotion of many electric light companies; and in the year 1882, the Electrical Exhibition at the Crystal Palace. It soon became apparent, however, that a great deal had yet to be done before the light would be available for ordinary use; and much capital was frittered away in vain attempts to introduce crude and impracticable inventions, and many of these companies utterly collapsed. After ten years, we are again reminded of these events by another exhibition of a similar character; but during this period there can be no doubt that important improvements have been made in the machinery generally. The present exhibition is supplied with the electric current from a central station in the neighbourhood. There are several of these in London now, fitted with compact engines and dynamos on the same bed-plate; and it is the almost invariable practice at these stations to dispense with belting, and couple the dynamos direct to high-speed engines, of which there are numerous types. For small installations, gas-engines are very generally employed; and this I think we may regard as a hopeful feature from our point of view. It, however, places obligations upon gas companies that they are not always able to meet. I heard the other day of an engineer who was seriously thinking of abandoning gas-engines, simply because in foggy weather the pressure of gas is reduced to such an extent that he cannot work his engines properly when he has most need of the light. If electric motors come into general use (and there is every likelihood of much being done in this direction), it will have the direct effect of cheapening the light, as the current will be utilized by day. That the electric light is finding favour, we cannot deny; but I presume the public will judge it from the regularity of supply and price. How much dearer it is than gas is difficult to determine, but any comparison is greatly in favour of gas.

The wide field which has been opened up for gas as a fuel has taxed the skill and ingenuity of enterprising manufacturers to provide the many different appliances for the public needs. Great as have been the improvements in stoves, there is still a good deal to be desired; and I for one shall be glad when some means have been devised to render all gas-fires perfectly silent, and when all such appliances are sent out with automatic regulators to prevent the wasteful use of gas, which gives rise to dissatisfaction and handicaps us in the race. It is now imperative to keep inspectors who are thoroughly competent to advise consumers, not only as to the best means of lighting their houses, but on all points connected with gas as a fuel. Services should be laid free—or to such an extent as to make them practically free; and all appliances for heating purposes should be fixed free of cost to the consumers. I think we shall all agree that deposits should only be exacted in exceptional cases; and anything that constitutes a barrier to the extended use of gas should be as far as possible removed. I know of nothing that oil or the electric light can accomplish as an artificial means of illumination that cannot be equally well effected by gas. To maintain the supremacy, however, which it has so long enjoyed, our best energies must be devoted, not only to the cheapening of its production, but to the education of the public in its proper use. We must let the people see that their interests are inseparably bound up with ours; then, formidable as our rivals undoubtedly are, I am sure we need have no fear for the future prosperity of our industry.

And now, gentlemen, I feel I have trespassed long enough upon your patience; and, in conclusion, may I ask the members to do all in their power to make this year a useful one to the Association generally? When the great German poet Goethe lay dying, it is said that he kept uttering the words "More light! More light!" That, in a multitude of directions, and with every variety of meaning, is the great cry of the present day—"More light!" It is our function to provide men with light—*physical, artificial* light—and we want to do the best we can for them. In order to do this, let us diffuse among ourselves such *intellectual* light as we may possess; sharing freely with other members of our Association whatever *new* light we may gain to aid us in the industry which we serve, and which in turn serves us. There are subjects of paramount interest, that are now engaging the attention of our profession, about which many of us would be glad to have the benefit of the knowledge gained by those who have had practical experience of them. We have enrolled amongst our number engineers who are experimenting with inclined retorts, water gas, and other systems that have for their object the cheapening of the production of our staple commodity; whilst others are doing much to popularize it and bring it into the homes of the working classes. I trust these gentlemen will come forward and give us the benefit of their investigations, so that our Secretary may have no difficulty in arranging for papers during the ensuing year. For myself, I should not have ventured to occupy this chair, if I had not felt that the success of the Association depends chiefly on the members themselves; and as one of you, I must claim your kind indulgence for whatever may

be my shortcomings in performing the duties of the responsible office which you have seen fit to ask me to occupy.

Mr. E. BOTLEY (Hastings) said as a near neighbour of the President, and knowing that he was in charge of one of the model gas-works of England, he wished to congratulate him on his address, which was full of points, and comprehensively and admirably written. He was sure the members would accord him a hearty vote of thanks.

Mr. NORTON H. HUMPHRYS (Salisbury) had much pleasure in seconding the proposition. The President, he observed, had dipped very deeply into his private note-book, and had placed a large amount of personal information at the disposal of the members, for which their best thanks were due to him.

The motion was heartily concurred in by the members.

The PRESIDENT, in acknowledging the vote, said he had experienced the utmost difficulty in finding matter for the address; and if he had succeeded in interesting the members in any small degree, he was very pleased.

THE PENTANE STANDARD.

The PRESIDENT announced that Mr. William Sugg was present, and had a communication to make to the members relative to the pentane standard.

Mr. SUGG said that the Secretary had kindly invited him to the meeting; and, as he was present, he (the speaker) thought that perhaps the members would like to hear something about the pentane standard, and, he might say, that in all probability they would hear a great deal more about it before long. A Commission had been appointed to investigate the question of the standard of light; and it was no doubt due to Mr. George Livesey that a practical start had been made in the matter. For a number of years, they had been using candles for the purpose of testing gas; and there had been a considerable amount of difficulty and trouble with them. Gas companies were often condemned for supplying gas below the standard, when it was really above it. This had been going on for a long time; and he had been advocating the adoption of a different standard for a good many years. But had it not been for this new effort made by Mr. Livesey, he did not think they would have been any nearer to a change six years hence than at the present time. However, Mr. Livesey had been instrumental in getting the new Commission appointed; and it now looked as if they would get a standard which would be both useful and correct. He believed the greatest difficulty the Commission had to overcome was the determination of what a parliamentary candle was. It was a very hard matter, as most of the members were aware, to determine what amount of light a parliamentary candle (of six to the pound) should give. The candles varied a great deal; and they had done so from time immemorial. The only thing they had been able to do, to get anything like an approximation of the true value of their illuminating power, was to make a certain number of experiments, and divide the errors of the candles over them. Therefore, before a proper start could be made in the adoption of a new standard, the difficulty would be to decide what a candle really was. This had been tried by Mr. Vernon Harcourt. He (Mr. Sugg) believed that some time ago a paper was brought before the Association by Mr. Methven, in which he referred to the pentane standard as proposed by Mr. Harcourt. That was a single-candle standard. It was proposed to make a gas of pentane, which was mixed with atmospheric air in a gasholder. There was no doubt, by this means, they would have a standard gas which might be produced many times over, and at any time. There would be no possibility of a variation of the pentane to any extent; or, he might say, it would be so slight that it could be disregarded altogether. The gas gave a light very similar to that of a candle; but as to whether it represented a candle flame, it had been difficult to decide. Both Mr. Methven and himself thought the standard was greater in illuminating power than the parliamentary candle—that was to say, if they took a number of candles made by Messrs. Miller and Co., or Messrs. Brecknell, Turner, and Co. (say, 100), and tried a number of experiments, the result would be that the single-candle pentane standard of Mr. Harcourt would be found to be higher than the average candle. There was a way of getting over this difficulty, and finding out what a candle was. The French Government had had a standard in use since 1868—the Carcel lamp—in which a certain quantity of colza oil was burnt, and which had been found, by independent experiments, to be equal to 9·5 candles. This oil was so carefully manufactured and tested by the French Government, that there was very little doubt that they might take it as being more accurate than the spermaceti candle. The candle, as he had observed, was subject to variations. With oil taken from the head of a spermaceti whale or a bottle-nosed whale, there must be differences in the illuminating power of the oil thus produced, or at least it was believed so. Then in the manufacture, the sperm oil had to be pressed out; and, as far as he had been able to learn, none of the makers of spermaceti had ever noted what was the amount of pressure put upon the spermaceti-bag. Some used one pressure, and some another—there was no regularity in it, though there might have been a little since Mr. Miller's attention had been called to it. If the spermaceti was squeezed too much, they obtained from it more of the free oil. If they did not get out all the oil, and left the flocculent substance dry, it was certain that they lowered the temperature at which the candle would melt; and consequently, the energy of the flame not having to melt it before being burnt, it gave a greater amount of light than if the spermaceti was very strongly compressed. Then there were difficulties with the cotton wicks, which he did not think it was necessary to refer to. Now with regard to the pentane, two ways had been proposed for making the gas. One was to put a certain quantity of pentane in a gasholder filled with a certain quantity of air. This might be done very readily by sealing up the quantity required for a charge in a bottle, and putting it into the holder; and, when the top of the opening in the holder was screwed down, they would always be certain of having the same quantity, and none would be lost. In the other plan, a gasholder was filled with air, which was passed through a carburetter. This was simply a flat box in which the gas passed backwards and forwards over pentane. The air took up a certain quantity of the latter; and made pentane air gas. This was much easier than the first-mentioned plan; but both arrived at the same result as regarded the standard light given, providing that the quantity of gas supplied was checked at the foot of the burner. The reason for this would be seen. If the gas happened to have a little more illuminating power than it should possess, less of it would be required to give the requisite height of flame in the burner; but if it was less than it should be, then more of it would be needed. This was a point which was most important. The standard seemed to be perfectly simple; and from a trial that had been made, it appeared to give accurate results. Some years ago there was a conference held of Engineers of the London Gas Companies on this question, to which he (Mr. Sugg) was invited. The matter was discussed at great length; and they decided that the pentane air gas would be the best standard to adopt in place of the candle, and the best way to use it would be in an Argand burner that would give the same amount of light as was required of the gas to be tested. Then they might have a burner at each end of the photometer and the disc in the middle; so that the effect of the state of the atmosphere and temperature and barometric pressure would be the same on both burners, and no correction would be necessary. This was agreed to; and he was asked to make a burner which would give a light of 16 candles. This was no difficult thing to do; and they made one like that which he had with him. [Mr. Sugg exhibited the burner, and explained its construction.] The burner was an Argand, with about 30 holes—a little smaller than they had for ordinary gas. Then there were two screens of blue glass to protect the eyes of the gas examiner from the flame, which was very bright. There was a cut-off line at the top part of the flame; and the light below that to the top part of the burner was equal to 16 candles. The rate of consumption per hour was about 1·8 cubic feet of air and pentane together. This appeared to be a surprisingly small quantity for the light given; but the pentane was very rich, and one pint lasted about three hours. There did not seem to be any variation from the start to the finish, except that the flame dropped down as evaporation of the pentane took place, and then all that had to be done was occasionally to turn the tap on a little to get the flame up to the line. There was another thing that should be borne in mind; and it was this: That if the flame was turned up too full, the illuminating power was reduced, and if it was turned down too low it was also reduced; so that all that had to be done was to keep it up to the 16 candles. Now, there was no doubt that here they had *the* standard; and to Mr. Harcourt belonged the credit of having proposed pentane for making the standard gas.

Mr. J. METHVEN (London), having been invited by the President to speak on the subject, said he was afraid this portion of the proceedings was to a certain extent informal. It was true he had had an intimation on the previous day that Mr. Sugg had kindly offered to give the meeting some information respecting this standard; but at the same time he did not expect to be asked to make any remarks on the question. There was one matter to which he might, however, allude; and it was this: That the difficulty the Standards of Light Commission had before them was, as Mr. Sugg had suggested, to ascertain the correct relation which existed between the various standards that had been proposed and the actual candle. It would be in the recollection of the members that, when he read his paper on photometry some two years ago, he explained that the screen which bore his name, and which was now rather extensively used, possessed a value (according to some experiments which he had made, and which were recorded in the paper) 2·8 per cent. higher than the candles which he used for determining the illuminating power of the gas. The system he adopted was to use the candles daily in the manner prescribed in the Instructions of the Gas Referees. The tests were made with three pairs of candles; and the screen was placed in position, and the value of the gas noted. The experiments were conducted over a period of thirteen or fourteen months; and the results of his records showed that the mean power of the screen was 2·8 per cent. higher than the candles. He maintained that this investigation was worthy of a considerable amount of attention, because the experiments were made daily, and extended over such a long period, which embraced every possible condition of the atmosphere during the year. There was another point, now that he was speaking, to which he might allude. The standard which Mr. Sugg had shown possessed great advantage, inasmuch as

they were comparing the light to be tested with a light something like its own power; and therefore, if there were any atmospheric conditions which operated on the one, they would naturally operate on the other, so no correction would have to be made in that way. There was a further point which Mr. Sugg might be able to explain, or perhaps he (Mr. Methven) might be wrong. It was this: That the difficulty he could see in using a 16-candle standard was—when they had a 16-candle light at one end of the bar, and the gas to be tested at something like 16 candles at the other end—how they were to estimate the difference between the two on the photometers at present in use. The travel, as far as he could then remember, between 16 and 17 candles was about $\frac{3}{8}$ inch. [Mr. Sugg: A little over that.] And he maintained that the distance the disc would have to travel would be so infinitesimally small that there would be some difficulty in estimating (say) a $\frac{1}{4}$ candle between the two. He might remark that he had not worked this out; and it might perhaps be all imagination on his part.

As the time allotted to the business portion of the meeting had expired, there was no further discussion on the subject.

The members and several friends then had dinner together; and an enjoyable evening was spent.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Fifteenth Annual Meeting of this Association was held at the Grand Hotel, Birmingham, on Thursday last. On the members assembling,

Mr. J. S. Reeves (Bilston) said a telegram had been received stating that the President, Mr. W. Littlewood, was seriously indisposed, and was unable to attend. He, therefore, moved that Mr. R. O. Paterson, of Cheltenham, should take the chair.

Mr. Lewis seconded the motion, and it was carried.

The Chairman said he was exceedingly sorry to occupy the chair under these circumstances. He was sure they would allow him to say, on their behalf, that they sincerely sympathized with their President in his sudden illness. They could, under the circumstances, only take the formal business of the meeting; and if when this was transacted Mr. Hunt had arrived, he would introduce a discussion on the present methods of testing gas, which he had undertaken to bring before them. Mr. Hunt was, however, engaged for a time with his Committee; and this had prevented his arrival.

The Hon. Secretary (Mr. C. Meiklejohn) said the telegram with regard to the President stated "Littlewood has been seized with sudden and serious indisposition, preventing his attending the meeting to-day. He had a letter of apology from Mr. Ellery, of Bath." The Secretary then read the minutes of the last meeting.

The Chairman said the only thing that arose upon the minutes of the last meeting was in relation to Mr. Elliott's retort-charging apparatus. Mr. Elliott was present and might, if he wished, explain the position of matters; but he (the Chairman) wished to intimate that the Sub-Committee appointed at the last meeting, had been endeavouring to have an investigation of Mr. Elliott's apparatus made at Ludlow. But after the last meeting of the Association, Mr. Elliott, finding that the Committee would have a useless journey to Ludlow to see the apparatus, unless he could completely isolate the continuous retorts from his other plant, and that very little good would be done, at once made arrangements to have this carried out. Owing, however, to the extreme strain upon gas-works in the winter, Mr. Elliott had been prevented carrying this out as speedily as was anticipated. He understood that Mr. Elliott had now completed the work, and lighted up his retorts; and the Committee would be able to report upon the subject at their next meeting, when the discussion on Mr. Hack's paper on Mr. Elliott's principle of continuous carbonization could be taken. With this explanation, he asked the meeting if it was their pleasure that he signed the minutes.

This was agreed to.

Annual Report.

The annual report of the Committee for 1891, and statement of accounts for the same period were then presented, as follows:—

The Committee have pleasure in submitting the following report for 1891:

The annual meeting was held in Birmingham on March 5, 1891—the President (Mr. C. Stafford Ellery, of Bath) in the chair. After the disposal of the routine business, the President delivered his Inaugural Address, in which he ably reviewed the various departments, and apparatus employed therein, which go to make up a complete gas undertaking of modern times; touching, in passing, on methods of enriching coal gas, and the electric light as a competitor.

On the conclusion of the presidential address, which was listened to with pleasure and attention, a very interesting discussion took place on the paper read by Mr. J. T. Lewis (of Wellingborough) at the previous meeting of the Association; the subject being "Weekly and Monthly Payments for Gas."

Your Committee desire to express the hope that the members generally will take part in the discussion of the various subjects brought before the Association from time to time, believing, as they do, that in this particular direction "in the multitude of counsellors there is wisdom."

At this meeting an innovation was introduced by the informal discussion of a subject suggested during the meeting. Mr. R. O. Paterson raised the question as to "The effect produced on the illuminating power of gas by the introduction of small quantities of air in the course of purification." A very interesting conversation followed; and the opportunity this method of discussion presents of affording a solution to any difficult problem will prove extremely helpful, if the members avail themselves of it.

The spring meeting was held in Leamington and Warwick, in response to the joint invitation of Messrs. Cross and Tew, on May 21, 1891. A most enjoyable day was spent in visiting Warwick Castle, the Leicester Hospital, and St. Mary's Church. After partaking of light refreshment in the Market Hall, which was graced by the presence of Mrs. Cross and Mrs. Tew, the return drive through Milverton and Binswood brought the members back to the gas-works, Leamington, which were inspected under the guidance of Mr. Cross, who directed attention to the method adopted by him to render the spent lime inodorous before its removal from the purifiers. The members were subsequently entertained to dinner at the Manor House Hotel by the Directors of the two Gas Companies, and the thanks of the Association were tendered to Messrs. Cross and Tew for the trouble they had taken in making the visit so pleasant; and they were asked to convey to their respective Directors the thanks of the Association for their kindness and hospitality.

The third general meeting of the Association was held at the Great Western Hotel, Birmingham, on Thursday, Oct. 22, 1891. The following officers were unanimously elected: President, Mr. W. Littlewood, West Bromwich; Honorary Treasurer, Mr. P. Simpson, Rugby; Honorary Secretary, Mr. C. Meiklejohn, Oldbury; Auditors, Mr. W. W. Hulse, Longton, and Mr. J. C. Belton, Wellington. Committee: Messrs. Cranmer and Hughes were elected to succeed Messrs. Littlewood and Bell, who retire; and Mr. J. S. Reeves was elected in place of the late Mr. Deakes. A very able paper was read by Mr. Hack, on "Elliott's Process of Continuous Carbonization." But the discussion was postponed; and it was thought advisable to appoint a Sub-Committee, consisting of the President, Ex-President, and Messrs. Paterson and Hack, to examine the process at Ludlow in the meantime, and report to a future meeting. The members subsequently paid a visit to the Birmingham Oxygen Company's works, and were much interested in the manufacture of oxygen, and in seeing the columnless gasholder, erected on the Mason and Gadd principle by Messrs. R. and J. Dempster, for the storing of the gas.

Four new members have been added during the year, and the Association has lost one by withdrawal; and, with much regret, they have to announce one by death—Mr. Deakes, of Worcester.

On behalf of the Committee,
Wm. Littlewood, President.
C. Meiklejohn, Hon. Secretary.

The Chairman moved the adoption of the report and accounts.

Mr. Lewis seconded the motion, and it was carried.

Election of New Members.

The Secretary said that the names of three new members had been considered by the Committee, and were recommended for election. They were: Mr. E. L. Adlington (Manager of the Worcester Gas-Works), Mr. James Gould (Manager of the Bewdley Gas-Works), and Mr. John M'Coll (Manager of the Halesowen Gas-Works).

The Chairman proposed that they be accepted as members of the Association.

This was seconded by Mr. Taplay and carried.

A vote of thanks to the Chairman closed the proceedings.

The members afterwards visited the works of Messrs. Thos. Piggott and Co., Hooper Street, Spring Hill, Birmingham, for the purpose of seeing the Sutherland arrangement of water-gas plant there, and witnessing the application of the gas for welding wrought-iron tubes.

On their return, they dined together at the Grand Hotel.

Mr. J. W. Auchterlonie, who has been for about twelve years in the service of the St. Andrews Gas Company, has been appointed, from a list of 46 applicants, Manager of the gas-works at Mullingar, County Meath, Ireland.

The Spontaneous Combustion of Coal.—At the Society of Arts last Wednesday week, Professor Vivian B. Lewes, F.I.C., F.C.S., read a paper dealing with the above subject. Itwas mainly on the lines of the communication he submitted to the Institution of Naval Architects about two years ago, a full abstract of which appeared in the Journal. As to storing coal on land, the author recommended that the store should be well roofed in, and have an iron floor bedded in cement; all supports passing through and in contact with the coal to be of iron or brick. If hollow supports were used, they should be cast solid with cement. The coal should never be stored during wet weather; and the depth in the store should not exceed 8 feet, and should only be 6 feet wherever possible. Under no condition must a steam or exhaust pipe or flue be allowed in or near any wall of the store; nor must the store be within 20 feet of any boiler, furnace, or bench of retorts. No coal should be stored or shipped to distant ports until at least a month had elapsed since it was brought to the surface. Every care should be taken during loading or storing to prevent breaking or crushing of the coal; and on no account must a large accumulation of small coal be permitted. These precautions, if properly carried out, would, the author said, amply suffice to entirely do away with spontaneous ignition in coal stored on land. He then proceeded to describe in detail the measures to be adopted to prevent spontaneous ignition on board ship. He recommended the placing, in various parts of the heap of coal, of steel cylinders, containing liquid carbonic acid gas, having nozzels fitted with a plug of an alloy melting at 200° F., or 93° C. Should the temperature reach this point, the plug would melt, and allow the whole contents to be blown out over the surrounding coal—producing a large zone of intense cold. The initial cost of the steel cylinders once overcome, the expenses would not be worth considering; but he expressed the opinion that the precautions he suggested would never be adopted by the owners of colliers, unless pressure was brought to bear upon them, owing to the slight extra expense and trouble involved. The discussion which followed the paper dealt chiefly with the branch of the subject relating to the carriage of coal in ships.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Inclination of Foul Mains.

SIR,—My attention has been drawn to Mr. Humphrys' communication in your issue of the 8th inst. (p. 445), in which he says that he is much gratified to learn, from my Inaugural Address recently delivered to the Manchester District Institution of Gas Engineers, that my experiences fully support the views on the above subject laid down in his book on "The Chemistry of Gas Lighting," and also in a paper read by him before the South-West of England District Association of Gas Managers on Sept. 9, 1890. Now, suffice it to say that I have not seen Mr. Humphrys' book, neither am I acquainted with any portion of its contents. I have, however, referred to his paper, and find that his object in reversing the fall of the foul main is to convey the condensed matter back to the hydraulic main, to thin the pitchy matter deposited there, and cause it to flow off more readily. But no claim whatever is made for enriching the gas by reversing the fall of the foul main; neither is any heat employed or recommended in the manner described by me. I, of course, cannot allow any priority of claim, as my arrangement was erected in the summer of 1882, and no alteration or addition has been made since it was first put up. It has been in constant use (say) for a period of 9½ years, and has never occasioned the slightest trouble whatever.

I shall be pleased to show the arrangement to any of my *confrères*, and to give any information regarding its working. In fact, I should be pleased if anything could be done, by forming a Committee, to elucidate this most problematical question, which is of such vital importance to the gas industry.

CHARLES ARMITAGE.

Lancaster, March 10, 1892.

Regulating the Seal in, and Drawing off Tar from, Hydraulic Mains.

SIR,—In your issue of the 8th inst., you give a sketch of an arrangement, which has been patented, for drawing off the tar from, and regulating the seal of, the hydraulic main. Is that not an old friend, with not a *new* face, for which see the JOURNAL for Dec. 16, 1879?

J. H.

March 12, 1892.

A Collapse of the Electric Light in the Crystal Palace Picture Gallery.

SIR,—Probably most of your readers who have visited the Electrical Exhibition now being held at the Crystal Palace have noticed the extensive incandescent lighting of the picture gallery, where a large number of lamps, arranged in groups of three each, are suspended in two rows running from one end of the gallery to the other. On Saturday evening last, I happened to be in the picture gallery when, at about 7.20, all the incandescent lamps mentioned suddenly went out, leaving the place in darkness. The gallery was fairly well filled with visitors at the time; and one of the officials, in order to prevent collisions, commenced calling out "keep to the right." This state of things lasted from five to ten minutes, when the lamps lit up again as suddenly as they had gone out; but enough time had elapsed for any mischievous person to have done considerable damage to the paintings without fear of detection. Upon inquiring of one of the Palace officials, he informed me that the light went out "quite accidentally."

The above would suggest, notwithstanding the large number of electric lights in the nave, that the possibility of a similar thing happening there is the reason why the management keep the old gas-jets near the roof just alight, which could be instantly turned up in the event of "the light of the future" failing in that much-frequented part of the Palace.

R. GARRAWAY RICE, F.S.A.

Croydon, March 14, 1892.

The London Smoke and Fog Plague and the London County Council.

SIR,—It is encouraging to know that the Progressive phalanx of the London County Council has inscribed on its banner of "Excelsior" the acquirement of the gas supply undertakings of Greater London. I trust that the consideration of this desideratum will now take precedence of the acquirement of the water-works.

It may be stated, with a near degree of accuracy, that every £1000 expended in the extension of the gas-works by the present Companies will involve an additional expense of double this sum—or £2000—whenever the gas-works have to be transferred; whereas the water-works are not likely to be extended before the time comes when their transference will be compulsory.

The delay which has occurred in acquiring the gas-works between the years 1860 and 1890 will cost the London ratepayers about £13,000,000 sterling; and it may be computed that another delay of ten years would probably mean an addition to the cost of the works equal to £5,000,000. A great part of this amount would be saved by immediate action on the part of the London County Council; and this saving alone would be a substantial advance towards the payment of the purchase-money for the water-works undertakings. In some quarters it is urged that only the net amount invested in the gas undertakings should be paid. But this would be palpably unfair, because a very great number of the gas shares have been purchased at a premium; and the present interest of 12 or 13 per cent. on the par or original value of the shares is only equivalent to 5 per cent. on the amount actually paid for the shares by many of the present owners.

The citizens of London have neglected their municipal duties in the past by not acquiring, like the citizens and burgesses of most of the flourishing cities and towns in England (such as Birmingham, Bradford, Manchester, Leeds, and Glasgow), their municipal undertakings; and this unfortunate neglect will have to be paid for. There is no shirking this fact.

The suggestion first made by me that a low candle-power gas should be supplied has been supported and admirably supplemented by one of your contemporaries. It is, however, considering the present opinions of the majority of the members of the London County Council, very doubtful whether Parliament would allow the Gas Companies to supply a gas of lower standard luminous value than the present one until the gas undertakings are acquired by the London ratepayers. The present statutory candle power cannot be obtained from the English gas coal *per se*. The result is that cannel, which is becoming gradually exhausted and more costly in the measure of its exhaustion, has to be utilized, or in its place an expensive liquid hydrocarbon; and this adds considerably to the cost of the gas.

The standard or statutory candle power that could be fixed for English gas coal is 14½ or 14¾ candles. This value would enable the coals to be economically distilled; and it may be said that the reduction of the photometrical standard to the figure indicated would be a saving both for the public and for the gas shareholders. The proportion of gain could be divided between the consumers and the gas shareholders, in the relation of three to the former and one to the latter—a proportion that could be insisted upon, in return for the permission to reduce the photometrical standard. I have already shown, in my articles "On Luminous and Non-Luminous Combustion,"* that for luminous efficiency the more intimate the connection of the elements of hydrogen and carbon constituting the hydrocarbons, the better; but for thermic value this is not so. Non-luminous fuel gas can be produced to give a specific thermic or heat value for much less than the cost of the statutory candle gas of the London Gas Companies; and in the event of the acquirement of the London gas undertakings by the County Council, the first duty will be to discover what is the lowest photometric value that will give the best results both for lighting and heating purposes, and the general supply and use of this fuel gas will for ever abolish the smoke characteristics of London fogs.

The practical advantages following a scientific procedure in the use of fuel have been conspicuously demonstrated by Messrs. Brunner, Mond, and Co., Limited, who, thanks to the initiative of Mr. Ludwig Mond, have adopted a similar system to that advocated by the author as the one and only natural remedy for removing the curse of London—the smoke fog. Here, in these phenomenally successful works, the fuel is converted into a gaseous condition, the nitrogenous elements being recovered and converted into a condition suitable for agricultural assimilation. The effect is advantageous both from pecuniarily and naturally economic and hygienic grounds.

As already pointed out, the powers for creating stock would enable the London County Council to purchase the London gas undertakings; the shareholders would merely require to take County Council bonds in place of their gas company's scrip. When once the municipalization of the London gas supply undertakings is effected, the electric light distribution would follow, and the two handmaids for the benefit of man—one the fuel gas for domestic heating, for driving motors, for electric light generation in numerous and well-distributed centres; the other, the distribution of electric energy for light and power—would be controlled by the chosen representatives of the millions of units that compose the population of the Great City. Actinic light would then replace non-actinic luminosity, and pure mist fog would replace the deadly black and sinister pall-like fog.

B. H. THWAITE.

Liverpool, March 4, 1892.

The Supply of Hydraulic Power.—At the tenth annual general meeting of the Hydraulic Power Company, held recently, the Chairman (Sir J. J. Allport) stated that there had been the same progress in the Company's affairs during the past twelve months as had occurred in previous years; and he hoped this would continue. The increase in the number of machines supplied with hydraulic power was 1022 in 1889, 1256 in 1890, and 1503 in 1891. The number of gallons of water pumped in the three years was 163 million, 206 million, and 267 million; while the number of gallons registered was 30, 33, and 36 millions respectively. The length of mains in London was 38 miles in 1889, 46 miles in 1890, and 53¼ miles in 1891; the gross receipts being £25,662 in 1889, £31,491 in 1890, and £38,377 in 1891.

The Grimwirth Reservoir of the Bradford Corporation.—At an important meeting held recently of the owners and occupiers of mills on the Rivers Wharfe and Dibb interested in the Grimwirth reservoir of the Bradford Corporation, a report was received from the three representative millowners appointed at the meeting held in December last to take action on behalf of the millowners generally for the enforcement of the obligations of the Corporation with reference to the restoration of the capacity of the reservoir, and for the obtaining of compensation for the loss sustained in the past through the deficiency in its capacity. The report stated that the representatives, acting under the advice of Counsel, had instituted proceedings against the Corporation for a *mandamus* to compel them to cleanse out the reservoir in accordance with the provisions of the Bradford Water-Works Act, 1854, and also to make compensation for the loss sustained in the past. They also reported that they had, together with the aid of their legal and engineering advisers, carefully examined and considered the provisions of the new Bill introduced this session by the Corporation, which contained several provisions affecting the interests of the millowners. They had entered into negotiations with the Corporation for the settlement of the action, and for the insertion of clauses in the Bill protective of their interests; and they were able to report to the meeting that terms of arrangement had been arrived at, which they were prepared to recommend the millowners to accept. Clauses for insertion in the Bill had also been agreed upon, subject to approval by the millowners. The effect of the proposed terms of arrangement and clauses was to restore the capacity of the reservoir by enlargement in accordance with plans deposited by them, in lieu of cleansing out; to enlarge one of the residuum lodges, so as to contain an area of about seven acres; and also to pay a specified amount to the millowners as compensation for the loss sustained by them in the past through the deficiency in the capacity of the reservoir. The action of the Committee was unanimously approved.

* See JOURNAL, Vol. LVI., LVII., and LVIII.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bill read a second time: Llanbradach District and Aber Valley Water Bill.

Bills committed: Bristol Gas Bill; Cleator Moor Local Board (Gas) Bill.

Bills referred to a Select Committee, consisting of Earl Ravensworth (Chairman), Lord De Ros, Lord Windsor, Lord Truro, and Lord Shute; to meet on Tuesday March 15: Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water Bill; Barrow-in-Furness Corporation Water Bill; Bradford Corporation Water Bill; Oxford Gas Bill; Southborough Local Board (Gas) Bill; Swinton and Pendlebury Local Board Bill.

Petitions against the Llanbradach District and Aber Valley Water Bill were presented from Harry St. Aubyn Goodrich and others; owners, lessees, and occupiers of lands, &c.; and the Bedwellty Local Board.

HOUSE OF COMMONS.

Tuesday, March 8.

BIRMINGHAM CORPORATION WATER BILL.

Mr. J. CHAMBERLAIN, in moving the second reading of this Bill, said it proposed to obtain a supply of water for Birmingham and the neighbourhood from a district in Wales, where rose the head waters of the Elan and the Claerwen, two small tributaries of the Wye. It provided for the wants not only of the city of Birmingham, but also of important towns, villages, and hamlets all along the route for 15 miles on either side of the aqueduct. There were two towns of importance—Wolverhampton and Worcester—and, in addition to these, there was the possibility that other towns, such as West Bromwich, Wednesbury, and other places, might hereafter find it to their interest to take advantage of the Bill. Altogether, the population concerned at the present time was about 1,250,000; and the necessity for some additional provision for water supply was urgent. In fact, the action of the Corporation of Birmingham had been delayed owing to the magnitude of the task, and to their desire not to incur fresh responsibility before it was absolutely necessary. The city of Birmingham acquired its waterworks in 1876; the average of the daily demand at that time being 8¼ million gallons. Since then it had more than doubled, and was now 17 million gallons. The supply of the present works and reservoirs was about 20 million gallons per diem. Consequently, it was clear that the maximum supply would be insufficient for the average demand that would arise in the next few years, while it was now insufficient for any extraordinary demand; and in a year of drought like 1887, the population would probably have to go short. It was calculated that the proposed works would take ten years to complete; and it was evident that, before they were finished, if they were undertaken immediately, the town and the district would be exposed to considerable difficulties in respect of water. In endeavouring to supply the deficiency, the Corporation, in the first instance, considered their local resources; and naturally so, because if these had been sufficient, gigantic expense would have been avoided. The water was now derived partly from rivers, but chiefly from one small river called the Bourne, and partly from deep wells sunk in the sandstone. There was reason to fear that, with the increase of the population, these sources would no longer yield water of the absolute purity now required by the sanitary authorities. It consequently became necessary for the Corporation to seek a supply at a distance; and they were confined within a very limited area for certain physical reasons. The average height of Birmingham was 400 to 500 feet above the sea-level, and therefore any supply of water by gravitation must itself come from a height of 800 feet above the sea-level. The lands proposed to be taken were at the top of the watershed of the head waters of the Wye; and, being at this level, they could supply Birmingham, while the watershed generally would be incapable of doing so, although it would supply many other large towns. The particular position selected was recommended some 20 years ago by Sir R. Rawlinson, C.B., who had been employed by the Corporation to report on the water supply, and was adopted by Mr. J. W. Gray, M. Inst. C.E., the City Engineer. The Bill providing for a supply of water from this district contemplated a conduit which would ultimately contain five great pipes, although it was proposed only to lay down two at first and to add more as might be required. It was proposed to take the whole of the watershed, which covered an area of 70 square miles, in order to secure absolute control over the purity of the water; but it was not intended to interfere more than was really necessary with the use of the land or with any persons having rights therein. The Bill contemplated the ultimate outlay of £6,000,000, although in the first instance the expenditure would be about £3,000,000. It was hoped to provide the money for the undertaking partly by an increase in the water-rate, although this increase would not be equal to the decrease which had taken place in the rate since the Corporation had acquired the water-works. Some opposition to the Bill had been announced in the name of the honourable member for Merionethshire (Mr. T. E. Ellis); but he thought this was a Bill eminently fitted to be dealt with by a Committee. He was glad to have had an interview with the representatives of the London County Council, when he explained to them the circumstances under which the proposal was promoted. He pointed out that, in consequence of the peculiar position of Birmingham, they were only taking the crown of the watershed—that was to say, 70 square miles—and that, as the whole of the watershed extended over 700 square miles, they were leaving 630 square miles for the purposes of any other populations which hereafter might find themselves in want of water. He was happy that they had satisfied their London friends. He had seen a statement that honourable members from Wales were promoting their opposition to the Bill rather in the hope of getting an instruction to the Committee than with the view of opposing the second reading. He should like to ask the honourable member for Merionethshire if this statement was true.

Mr. T. E. ELLIS said the instruction did not cover all their objections, but only part.

Mr. CHAMBERLAIN supposed he must deal with the general principle, which seemed to him to be involved in the opposition to the second reading. This principle, which had been stated in the public Press, was "Welsh water for Wales;" and he must say that, in the whole course of his experience, he had never heard of such an extraordinary and peculiar development of nationality. The water was not Welsh water, for it came from heaven and went to the sea. As to the objection that Wales might be in need of water, he had been informed that it was want of works for storing and distributing it, and not want of the water itself, which was troubling Glamorganshire and South Wales. Even if they took everything required for the Midland districts, there would still remain an enormous watershed. The only streams they proposed to take were the Elan and the Claerwen and their tributaries. Some anxiety had been expressed on behalf of the commoners whose rights might be interfered with; but the Corporation of Birmingham did not desire to interfere with any right which had hitherto existed, or which could be shown to exist. The only restrictions which it was desired to make related to the purity of the water, which, as everybody was aware, was a subject of the very first importance. When the Corporation had expended their six or seven millions sterling upon this scheme, they would wish to feel sure that the water was wholesome, and was not polluted in any way whatsoever. There were one or two ways in which rights of common might interfere, though he did not think they actually did so, as at present used. They were not dealing with private, but with public interests; and the sole object of the Corporation was to secure the purity of the water. When this had been secured, they would be satisfied.

Mr. ELLIS said that, although it was true this was a Private Bill, its provisions and scope were so extensive, that it became of public, and even of national importance. It was, therefore, well that the House should know upon what grounds, and by the extinction of what rights, the powers included in the measure were to be obtained. It was said that the details could be examined in Committee; but there were principles underlying the Bill which ought to be first brought to the knowledge of the House. When the matter of water supply, especially in regard to London, came to be looked into, it was clear that the sources of supply were strictly limited. The last census showed that the population of Birmingham had not increased so rapidly during the past decade as, for instance, parts of Glamorganshire and Monmouthshire. As matters at present stood, the Rhondda Valley and Swansea were frequently within measurable distance of a water famine; and now it was proposed to take this large supply from the Elan and the Claerwen, the two principal tributaries of the Wye. How far ought this to be allowed, having regard to public health and safety? The public rights and privileges which would be interfered with by the Bill were considerable. Did the House realize that, amongst the powers sought, was that of acquiring some 65,000 acres of land, of which no less than one-half was commonage? He maintained that the House, before consenting to the second reading of the Bill, ought to examine the powers asked for in the light of the provisions of the Commons Preservation Act of 1876. The Bill was not only for the purpose of supplying the municipal water demand of Birmingham; there was a proposal to supply water to local authorities and county councils within 15 miles of the line. In fact, it was a great money-making and commercial concern, and Birmingham was to be a sort of universal water provider for the million. If the Bill were read a second time, the instruction to the Committee that was to be moved ought to be enlarged, in order that the immemorial privilege of free fishing in the waters to which the measure applied might be safeguarded; and also to secure that some proper compensation should be made to the County Councils of Radnor and Brecon, as well as to individuals whose rights would be affected. He moved that the Bill be read a second time that day six months.

Sir J. BAILEY seconded the amendment. He held that the waters of the Wye should be used in the first place for the benefit of the population of the valley of that river. The city of Hereford, which he represented, had, he said, undertaken costly drainage works, in order to preserve the purity of the stream. Heaven had sent water to Hereford and not to Birmingham. If Birmingham were allowed to absorb the principal part of the waters of the Wye and of the rivers to which the winter flooding was due, it would be a matter of great difficulty to ensure purity in the water supply of Hereford. It was proposed to raise across the river a dam 130 feet high; and there was great danger connected with such enormous weirs. In this case, if an accident occurred, it would possibly cause serious injury in three counties—Brecon, Hereford, and Monmouth; and there would be no means of making the Corporation responsible. Every interest in the valley of the Wye would be affected by the proposal. Among the opponents to the Bill were the London County Council and the Corporation of the City; and what could be their object? Simply that they were looking forward to obtaining their water in future from this district. In the circumstances, he thought those who disapproved of the Bill were well within their rights in asking the House to protect them against the second reading, seeing that it was opposed by five counties—in short, by every interest down the Wye. They did not complain of Birmingham seeking to get its water where it pleased; but they did complain that the Bill was promoted in the interests of Birmingham, to the direct exclusion of all those of the neighbourhood.

Mr. SHAW-LEFEVRE said he might have to move on another occasion the instruction of which he had given notice; and he wished now merely to explain his position. He had not any intention of opposing the second reading of the Bill, for he thought a good case had been made out for referring it to a Select Committee; but he wished to ensure, when the Bill went before Committee, that every opportunity should be given to those whose interests were affected of appearing and giving evidence. On the understanding that this instruction would be accepted, he would not oppose the second reading.

Sir JOHN LUBBOCK, having thanked the right honourable member for West Birmingham (Mr. Chamberlain), on behalf of the London County Council and of honourable members representing Metropolitan

constituencies, for his courtesy in postponing the second reading of the Bill for a few days, in order that they might give it consideration, expressed regret that the Bill had been introduced at the present time. The population in England was, he said, increasing so rapidly, and the areas suitable as gathering-grounds for the water supply of the great cities were being so steadily appropriated, that it was becoming a matter of great national importance that water supply should be economized as much as possible. Unfortunately, some important mistakes had already been made. Liverpool ought, according to the wise recommendation of the Duke of Richmond's Commission, to have drawn her supplies from the Westmoreland Lakes; whereas she had been allowed to come south and appropriate the Vyrnwy in Wales, which ought to have been reserved for the central and southern districts. The Committee of the House which sat last year reported that—

> In view of the possibility of its being ultimately established that the present sources of supply cannot be extended, and that additional sources are required, and in view also of the fact that the possible fresh areas of supply are limited, and are already being drained for other large communities, your Committee think that Parliament may well consider, before granting any powers for further encroachment upon those areas, how far provision ought fairly to be made for the possible requirements alike of the Metropolis and of the other large populations upon the lines of supply.

In consequence partly of a representation from the London County Council, and partly, no doubt, on account of this recommendation of the Committee, Her Majesty's Government were about to appoint a Royal Commission to inquire and report on the question of the water-bearing areas. Under these circumstances, he should have been glad if all important appropriations of such areas could have been suspended until the Commission had reported. At the same time the Metropolitan members were very reluctant to oppose any measure which was for the advantage of the people of Birmingham. Perhaps he should be asked what they had to do with it. In fact, the remark had been made to him that they could not complain that Birmingham should move, if London could not make up its own mind. But London was not allowed to make up its own mind. London was denied powers which every other municipality enjoyed. London, and London alone, was precluded by law from introducing a Bill dealing with its own water supply. They had a Bill this session again—and they had one last year—removing this disability; but at present they lay under it. This was very unjust to London. They were compelled to sit with their hands behind them and see other cities appropriating the water-bearing areas one after the other. There were now comparatively few left; and this Bill took one of the best. It seemed very doubtful, and, as he understood, was hardly maintained even by Sir T. Martineau, that the matter was urgent. In his speech to the Corporation, he alluded to the Bourne, which would be a natural source of supply for Birmingham; and he said that their Engineer (Mr. Gray) "could not conscientiously say that it would last over a longer time than 20 years." Why, then, this great hurry? They asked the representatives of Birmingham whether the very reason why this scheme was pressed forward just now was not on account of their action in London. This was positively contradicted; but he had within the last two hours received an official copy of a speech made by Sir T. Martineau to the Corporation of Birmingham on the 7th of April, 1891, and he based his support of this Bill on the ground that London was at present moving in the matter. He said:

> There is a most imperative reason for not dallying with the matter, ... and that is what is being done by London. No doubt London is in the initiary stage. No doubt a great deal will have to be done before any Bill can be got into shape for a supply from a distance, or even a nearer source, for London. In some shape or another, it will have to be settled which of the governing bodies of London, in case the Companies are bought out or superseded, is to have the control of the water supply. Therefore, we have a little time before they begin to be our rivals. But I think we must bear this in mind: Our rivals they will be, sooner or later; and we have just now an opportunity of running before them, and getting hold, if we can, of these valuable rivers for the supply of Birmingham.

The population of the Metropolis was increasing with great rapidity. Already the consumption reached 200 million gallons a day. In a few years an additional supply would be a necessity. Of course, it would be out of place to go into this question now; but he alluded to it to explain the doubts they felt about the Bill. Metropolitan members could not support, but were reluctant to oppose, a Bill which they were told by the promoters was urgently required for Birmingham. At the same time, they heard from Birmingham that, in the opinion of a great many there, the present supply was sufficient, and even ample, for years to come, and that, if needed, much more might be obtained in the district itself. While, therefore, they did not feel that they ought to oppose the second reading of the Bill, they hoped that the Committee would satisfy itself—first, that Birmingham urgently required an additional supply; and, secondly, that no such supply could be obtained within the district.

Mr. R. COOKE opposed the second reading, on the ground that, because the London County Council had not the power to deal with its own water supply, Birmingham was being allowed to steal a march upon London.

Sir H. JAMES said he believed it would be very strong action to reject the Bill, and, in order to facilitate its progress, he gave notice that he would move the following instruction should the second reading be agreed to: "That it be an instruction to the Committee to whom this Bill is referred that provisions be inserted in the Bill reserving the substantial use and enjoyment to the public of the waters of the Wye, and other rivers affected by the Bill, to the same extent and in like manner as if this Bill were not passed, or a full equivalent for such use and enjoyment."

Mr. COURTNEY pointed out that all the questions raised in the course of the discussion could be examined by the Committee.

The discussion having been continued by Mr. Burdett Coutts, Mr. Stuart, Mr. Dixon-Hartland, Sir H. Vivian, Mr. Kendrick, and Mr. Lawson,

Mr. CHAMBERLAIN said that since he had addressed the House in moving the second reading of this Bill a totally new appearance had been given to the question by what had fallen from the right honourable gentleman the member for the University of London (Sir J. Lubbock), and had been taken up by other London members. When he had moved the second reading, he had been confident, not only that there would be no opposition on the part of London members, but that they would have the support of every member for a London constituency, because it was perfectly clear that their interests were the same. His right honourable friend, however, had made a speech which, in his opinion, had given rise to a good deal of misapprehension. He said—no doubt with perfect accuracy—that when they had had a conference between Birmingham members and London members, the latter had represented to them that they would greatly prefer that this matter should stand over until they also were prepared to give it consideration, and would only withdraw their opposition if they were satisfied that the case of Birmingham was urgent; and they had also asked whether Birmingham was proceeding in any fear of the rivalry of London. As a matter of fact, the urgency would be exactly the same if there was no London in existence. Birmingham's need was urgent, because, as he had stated, the existing average demand was 17 million gallons; and at present the maximum supply was only 20 millions. In two or three years the average demand would be up to the maximum supply, as already the maximum demand was above the maximum supply. It was indisputable that, from some source or other, Birmingham must get a further quantity of water. The tract of country which it wished to acquire was the only land suitable for the purposes of that town. For the wants of London, however, there was any amount of suitable land; for London, being on the sea-level, could get its water from a very much lower position than Birmingham could. The tract of land now in question would not be convenient in the case of London, and could only be required by the Capital after it had exhausted all supplies of water from much more suitable districts.

After further discussion,

Mr. RITCHIE said, with regard to the general question, he understood that there was no dispute at all that there was a plentiful supply of water in Wales for both London and Birmingham, and that Wales did not object to the water being taken, subject to the protection of her interests. The question seemed entirely one for inquiry by a Committee; and if there was no compromise arrived at, the Bill could be dealt with when it came back to the House. He did not think he was at liberty to vote against the second reading. If it was the general wish of the House that the Bill should go before a Hybrid Committee, he did not suppose there would be any objection.

Mr. CHAMBERLAIN said there would be no objection on the part of the promoters. He was not prepared to accept the suggestion of Sir H. James, which he had not had time to examine sufficiently.

The House then divided, and the numbers were: For the second reading, 244; against, 102—majority, 142.

The Bill was then read a second time.

Mr. ELLIS then gave notice that he would move that the Bill be referred to a Hybrid Committee.

Mr. SHAW-LEFEVRE also gave notice of his intention to move an instruction with regard to the rights of commoners under the Bill.

Thursday, March 10.

LONDON WATER COMPANIES AND THEIR POWERS.

Mr. LABOUCHERE asked the Secretary of State for the Home Department whether, in view of the fact that by law the water-rates become due quarterly, and on the first day of each quarter, in advance; and that persons neglecting to pay the rate when it becomes legally due are liable to have their water cut off (with the result that most householders are usually legally in arrear, owing to the custom of the water-rates being demanded only half yearly, when one quarter has expired and another is partly due) and to the abusive power that this difference between law and custom places in the hands of the Water Companies, he contemplates legislative action to amend the law on this point.

Mr. RITCHIE: The Acts of the Water Companies usually provide that the water-rates shall be paid in advance by equal quarterly payments; and I believe that it is the case that the rates, as a general rule, are only demanded half-yearly. The Acts also empower the Companies, where the rates are payable by the occupiers, to cut off the supply if the rate is not duly paid at any of the times of payment specified in the Act. The result of these provisions would appear to be that a Company might cut off the supply if the rates were in arrear, although they had not actually been demanded. The question as to the continuance of this power is, I think, one which should be considered when there is further general legislation with regard to Water Companies. At the same time, I may say that I have never had brought under my attention any case where this power has been abused by a Company.

Friday, March 11.

BIRMINGHAM CORPORATION WATER BILL.

Mr. ELLIS, in accordance with notice, moved that the above Bill should be referred to a Hybrid Committee.

The motion was agreed to.

Mr. SHAW-LEFEVRE then moved—"That it be an instruction to the Committee to whom this Bill is referred that they have power to inquire and report to the House whether it is necessary to extinguish the rights of the commoners and the user of the commons by farmers over so wide a district, and whether provision should be inserted for securing to the public free access to the commons proposed to be acquired, other than so much as is required for reservoirs and other works." He said that in his opinion the matters to which he had referred in his motion could not be fully dealt with by the Hybrid Committee unless they were specially instructed.

Mr. CHAMBERLAIN said that if the right honourable gentleman would withdraw the motion, he would give him an assurance that a clause should be inserted in the Bill affording the public full rights of access.

Mr. SHAW-LEFEVRE said he must press his motion.

The SPEAKER, in answer to a question by Mr. Chamberlain, having expressed the opinion that the instruction was necessary, although it might have the appearance of acting from excess of caution,

The motion was agreed to.

Sir H. JAMES, who had on the paper, in the interest of the city of Hereford, an instruction with reference to the water proposed to be taken from the Wye, said he did not propose to move it, as the promoters of the Bill had promised to reserve to Hereford all the rights they now have.

The following progress was made with Bills last week:—

Further Standing Orders complied with: Southend Gas Bill.

Bills referred to a Select Committee consisting of Mr. H. Gladstone (Chairman), Mr. W. F. Lawrence, Mr. A. C. Corbett, and Mr. Dunn; to meet on Thursday, March 17; East Grinstead Gas and Water Bill; London County Council (Subways) Bill; London County Council (General Powers) Bill; Southend Gas Bill.

Bills referred to a Select Committee consisting of Sir W. Houldsworth (Chairman), Sir J. Colomb, Mr. Craig, and Mr. J. O'Connor; to meet on Tuesday, March 15: Airdrie and Coatbridge Water Bill; Blackburn Corporation Bill; Lanarkshire (Middle Ward District) Water Bill; Ormskirk Gas Bill.

A petition against the Blackpool Improvement Bill was presented from the St. Anne's-on-the-Sea Gaslight and Coke Company.

Mr. John Fentiman, who some time ago was with Messrs. T. Fletcher and Co., has accepted an appointment as representative of the new firm of Fletcher, Russell, and Co., Limited.

The Price of Gas at Haslingden.—At a meeting of the tradesmen of Haslingden, held last Wednesday, a resolution was passed unanimously refusing to accept the reduction of 2d. per 1000 cubic feet in the price of gas recently conceded by the Gas Company (mentioned in the JOURNAL last week) as being satisfactory; and it was decided that unless the Directors make a further concession, the whole of the tradesmen will cease to use gas. It was decided to ask the Mayor to convene a meeting of the ratepayers to reconsider the matter, with the view to the introduction of electric lighting.

Lecture on Gas-Meters.—Last Wednesday, a lecture was delivered to the members of the Birmingham and Midland Institute Scientific Society, by Mr. S. R. Barrett, of the Birmingham Gas Department, on "Gas-Meters, Wet and Dry." The lecturer, whose address was illustrated by diagrams and experiments, said the original gas-meter was produced in 1815 by Clegg, and was practically identical with the wet meter in use at the present time. He told his audience that it was a mistake to suppose that a meter had anything to do with the pressure or quality of the gas which passed through it. The secret of low gas bills was the adoption of better burners.

John Wright and Co., Limited.—According to the report to be presented to the shareholders of the above Company at the general meeting to be held on Thursday, the trading account shows a balance of £18,621, which, after various deductions have been made, leaves for disposal the sum of £14,888. This the Directors recommend should be appropriated as follows: To pay a dividend at the rate of 6 per cent. per annum for the past half year on the preference shares, less income-tax, thereby making up the dividend to 6 per cent. for the year, £1170; to pay a dividend at the rate of 10 per cent. per annum for the past half year on the ordinary shares, free of income-tax, thereby making up the dividend to 10 per cent. for the year, £2000; commission to Managing Directors, £1854; to carry to a reserve fund, £7000; to carry forward to next year, £2863.

Gas Affairs at Longton.—The minutes which were presented by the Gas Committee at the meeting of the Longton Town Council on the 3rd inst., contained a letter from Alderman A. G. Prince, tendering his resignation as Chairman, owing to the recent action of the Council in twice refusing to allow the matter of meter-rents to be referred back to the Committee. The resignation was accepted with extreme regret. In consequence of a statement made at the previous meeting of the Council, to the effect that the gas-works were not being properly managed, and that gas was not being made as cheaply as at other works in the country, the Committee also submitted a comparative statement, showing on an average of similar gas-works owned by local authorities as follows: Capital, £82,997; price of gas, 2s. 10½d. per 1000 cubic feet; gross profits, £5013; net profits, £1018; quantity of gas sold 80,801,688 cubic feet; gross profits per 1000 feet, 1s. 2·9d. Longton, capital, £110,000; price of gas, 3s.; gross profits, £7183; net profits, £2234; quantity of gas sold, 85,405,300 cubic feet; gross profits per 1000 feet, 1s. 5·2d. The Committee stated that they felt the Council should make it clear by resolution whether they wished them to manage the works for the benefit of the consumers only, or for the ratepayers generally. A long and rather acrimonious discussion followed upon the subject, and ultimately the minutes were adopted, with the words forming the last paragraph omitted.

Actions against the South Metropolitan Gas Company.—Last Friday, Mr. Justice Stirling had an application made to him by Mr. Graham Hastings, Q.C., for an injunction to restrain the South Metropolitan Gas Company from committing a nuisance; and as the question for decision was one of fact—viz., whether or not a nuisance was committed—he thought the case should be tried once for all. His Lordship suggested that the pleadings should be completed, and liberty given to apply to advance the trial. Mr. Hastings said, as both parties had gone to considerable expense in preparing affidavits, it would be as well to take advantage of this by using the affidavits at the trial—each party having liberty to cross-examine. The Solicitor-General (Sir E. Clarke, Q.C., M.P.), who appeared for the Company, said he did not think this course would save time. Mr. Hastings said the action was brought by the owner of 400 houses out of an estate of 600 in Bermondsey; and it now appeared that the owner of the remaining 200 houses had commenced proceedings in another branch of the Court. He proposed that this action should be transferred to his Lordship's Court, or abide the result of the present one. The Solicitor-General thought it should be transferred and then stayed. Mr. Hastings asked to have inspection of the defendants' works upon the usual terms of giving reasonable notice. The Solicitor-General remarked that his friend would not have to complain of any difficulty in this respect.

MISCELLANEOUS NEWS.

THE SUGGESTED MUNICIPALIZATION OF THE LONDON GAS AND WATER UNDERTAKINGS.

Our readers are aware that the most prominent feature in the programme of the Progressive Party, who form the large majority of the newly-elected County Council for London, is the municipalization of the gas and water undertakings, in conjunction with the docks and tramways. It was unnecessary to reproduce in our columns the arguments adduced by the various candidates in support of this project, or those brought forward against it by the Moderates. One speaker, however, on behalf of the latter party (Sir H. James), stated that London stood to lose tens of millions by such "rash and hazardous speculations" as those above referred to. This remark called forth the letter to the *Pall Mall Gazette* to which reference was made in our editorial columns last week. It may be of interest to reproduce the communication, as well as the one sent in answer to it. The first letter was as follows:—

At present London pays £4,500,000 a year for gas which costs £3,250,000 to produce. Result, £1,250,000 apportioned to the benefit of gas shareholders. To the Water Companies' shareholders London pays about £750,000 over the cost of service. In gas and water dividends it pays in cash about £2,000,000 per annum. The rates levied in London amount now to £8,000,000 per annum—averaging, on the figures for 1891, 5s. 1¼d. in the pound. The gas and water dividends add 25 per cent. to this total, and, regarded as rates, raise the average of 5s. 1¼d. to 6s. 4½d. in the pound.

It is estimated that London could supply itself with water at a capital cost of £14,000,000; and, at present values, if it took over the gas undertakings, their cost would be £25,000,000. If the County Council borrowed the £39,000,000 at 3 per cent. (it could get the money at 2¾ per cent.), the annual interest charge on London would be £1,170,000; and the consequent relief to the ratepayers' pocket—assuming either that no profit was made on supply, or that profits were made as at present, and applied in direct relief of the rates—would be £830,000. This would credit the average of 5s. 1¼d. with a reduction of over 8 per cent.—that is, it would bring it down to about 4s. 8¼d. But it is unlikely that we should pay more than £19,000,000 for our gas. Therefore the annual charge would be 3 per cent. on £33,000,000—that is, £660,000; and the annual relief to the rates, on the previous assumptions, would be £1,010,000, or over 10 per cent. Thus the average rate would be reduced by about 10 per cent., or from 5s. 1¼d. to 4s. 7¼d. But the average rate, when increased by gas and water dividends, amounts to 6s. 4½d. Therefore the total reduction on the present rating burden would be 1s. 6d.; and the contrast would work out as follows:—

	s.	d.	
Present average rate charge on London householder . . . . . =	6	4½	in the pound.
Future average rate charge on London householder . . . . . =	4	7¼	"
Advantage to householder from municipalization of gas and water . . . =	1	9¼	"

As to the "rash and hazardous speculation" of the matter, take the analogy of some of our largest provincial municipalities supplying themselves with gas and water. The seven Municipalities of Manchester, Leeds, Nottingham, Bradford, Leicester, Oldham, and Bolton form a highly respectable and unspeculative group of self-suppliers. The rateable value of these seven towns aggregates to £10,000,000. The rates collected over the group appear to amount to £1,500,000—say, 3s. in the pound. Returns for 1888 show that the water revenue of the group was £630,000. If all this was, as it might be, applied directly to the relief of rates, the average in the pound would be reduced by 42 per cent.—that is, to 1s. 9d. On the other hand, if the water supply were in the hands of private companies, earning (say) 8 per cent. dividend, the addition to the average rate of 3s. would be considerably more than the reduction capable of being effected by municipal ownership. The group in question paid £11,250,000 for their water-works and capital outlay up to 1888. If we take £11,250,000 as their value in private hands, then £900,000 would be required for an 8 per cent. dividend. That, on a total rate collection of £1,500,000, equals a 60 per cent. rise on 1s. 9½d.; thus bringing up the average to 4s. 9½d. The contrast works out as follows:—

	s.	d.	
Rate charge on householder if the water supply is in private hands	4	9½	in the pound.
With water supply municipalized, and if water profits are directly applied to the relief of the rates	1	9	"
Advantage to householder from municipalization	3	0½	in the pound.

Now take the gas statistics for the seven Municipalities. The capital cost of supplying their own gas up to 1888 amounted in the aggregate to £6,250,000, the interest on which represents £187,000. If the gas were in the hands of private companies earning 8 per cent. on the £6,250,000, the extra charge on the ratepayer would be £313,000. This would raise the average rate by over 20 per cent., bringing it up from 3s. to 3s. 7¼d. On the other hand, the Municipalities, by being their own purveyors, make a net annual profit of £213,000. If this amount were applied directly in relief of the rates, the average would be lowered by 14 per cent., or to 2s. 7d. in the pound. We have now the following results: Municipalized water supply potentially reduces the rate of 3s. by 1s. 3d., and municipalized gas supply potentially reduces the rate of 3s. by 5d., therefore the total potential reduction is 1s. 8d.—reducing the average rate to 1s. 4d. in the pound. On the other hand, private water supply would raise the rate of 3s. by 1s. 9½d., and private gas supply would raise it by 7¼d.; making the total rise 2s. 4¾d., and bringing the rate up to an average of 5s. 4¾d. in the pound.

The following was the reply to the foregoing letter:—

Your correspondent has clearly discovered "the newer arithmetic," since, under the rules of arithmetic *secundum* Colenso, the utmost possible saving in poundage to a ratepayer which his own figures, after adding (say) the low figure of 3 per cent. for the "service" of his proposed £39,000,000 of gas and water stock, can be made to show is a paltry 4¾d. He has fallen into the fundamental and fatal error of thinking that the cost of municipal administration under existing heads will fall *per se*, in consequence of the acquisition of the gas and water undertakings by the London County Council.

The present cost of municipal administration, *plus* gas and water rentals, is as follows:—

	s.	d.
Municipal administration	5	1½
Gas and water rents	1	3¼
Total	6	4½

The cost of municipal administration under his scheme, *plus* service of gas and water stock, will be as follows:—

	s.	d.
Municipal administration	5	1½
Service of gas and water debt of £39,000,000, at 3½ per cent., say	0	10½
Total	5	11¾
Profit	0	4¾
Present cost	6	4½

His whole case is, however, bound up with the notion that a Gladstonian majority, with a House of Lords to face in a matter where "going to the country" or creating Peers *ad hoc* would be out of the question, and containing a due proportion of the Isaac Holdens, Brunners, Peases, Basses, Cyril Flowers, and other rich men of the Parliament of 1886, will either wipe out the water undertakings without any compensation, or compel the Companies to sell for what is much less than half the market value of their stock to-day. Suppose that the utmost even a Gladstonian majority will do be to deduct from the market value of the water stocks the capital value of the increased and improved supply which a Royal Commission *ad hoc* may pronounce requisite—and this, I believe, is what Sir Thomas Farrer proposes—and that London has to buy its water for (say) £22,000,000, the service of an increased gas and water stock of £47,000,000 will swallow up just 2d. in the pound of the total relief of 4¾d., which is all your correspondent's scheme promises. Whether a London County Council, "bossed" by Messrs. Costello, Burns, Quelch, Webb, and Co., are likely to hold out against demands on the part of gas and water employees for increased wage and leisure, which, if granted, would swallow up the 2¾d. that would be left to them "to play" with, is another question.

Our contemporary *Industries* deals with the question, but upon a different basis, in the following article which appears in the current issue:—

The recent London County Council election has resulted in a large working majority in favour of the municipalization of those monopolies which are at present in the hands of private companies, and which, although regulated and controlled by legislation, are worked primarily in the interests of the shareholders. The Progressive programme of the recent election laid particular stress on the need for a good supply of water for London, owned and directly controlled by the representatives of the ratepayers. It has, however, been repeatedly urged that this important step is one which must be taken with all due precaution; and, until it is decided what is the best supply for London, progress in this direction must necessarily be delayed. Next to water, the municipalization of the gas supply appears to be the problem which deserves immediate attention. It is somewhat remarkable, however, that, although a good and ample supply of gas for a large city is of primary importance, yet past legislation, in insisting on the principle of the sliding scale, has practically conceded the point advocated by those persons who desire the complete control of the gas industry in London. That the reward of the shareholders should be inversely proportional to the price of gas, admits that the gas supply is for the benefit of the consumer; and thus municipalization of the supply must logically follow this concession. In former articles on the lighting of London in connection with the fog and smoke question, we have already shown that the present machinery of the Gas Companies is well adapted for the requirements of London, and that there is now no real ground for objecting to their acquisition by the controlling authority. Just now, when coal is at famine prices in London, the advantages of a cheap and economic gas supply, available at all times and under public control, is obvious.

At present we have in London an altogether anomalous condition; for during the last few days a considerable influx of orders has been given for gas-stoves for heating purposes, notwithstanding that the present quarter shows a considerable increase in the price of gas. Increased consumption with increase of price must be very gratifying to The Gaslight and Coke Company and its shareholders; but no householder in London can possibly look upon this state of affairs with satisfaction. Although this question was made a party one at the recent election, it is noteworthy that, at a recent important public meeting at Chelsea, the Progressive and Moderate candidates for that division were equally strong in their condemnation of the present condition of affairs in the area supplied by The Gaslight and Coke Company. Not only at a crisis in the coal trade, like that at the present time, do the shareholders in gas companies benefit at the expense of the public in the sale of gas, but their attitude in increasing the price of coke is directly antagonistic to the interests of the public, and even opposed to the policy put forward by Mr. Livesey, the Chairman of the South Metropolitan Company. It may be recollected that, at the last general meeting of this Company, Mr. Livesey drew attention to the fact that coke was not only apparently, but really, the cheapest fuel in London; and that he hoped, by maintaining the low price of coke, to succeed in obtaining coal in London at a cheaper rate. If the price of coke is simultaneously raised with the price of coal, as has recently been done, surely this laudable object on the part of Mr. Livesey and his co-Directors of the South Metropolitan Company is frustrated.

Municipalization of the London gas supply appears to us to be the only way out of the difficulty; and we hope that the new Council will proceed to a consideration of this question at once, and fulfil their pledge to the electors on this point while the investigation on the water question is being carried on. The question of purchase should be an easy one to solve. Even the most faint-hearted members of the Council, when they fully realize the advantages which have accrued to Manchester, Bradford, and Birmingham from the acquisition of the gas-works by the town, should not hesitate in taking this step. The Gas Companies in London have no legal monopoly; and the County Council can obtain parliamentary powers to construct a competing supply, unless the Companies consent to transfer their works on equitable terms. Our own view as to what might be meant by equitable terms is based on the consideration that the market value of the Gas Companies at the present time is what their works and plant would bring as a means for heating, not lighting, London. In a recent article we have given our views on this subject at some length, and have since had the pleasure of noticing that our contemporary, the JOURNAL OF GAS LIGHTING, thinks our view that a diminution in the illuminating power of London Gas—arranged on a sliding scale, so that a cheaper gas for heating purposes may be obtainable—is worthy of consideration. We have all along protested that there is no virtue in 16-candle gas. Why the number 16 was chosen we do not remember; but all that can be urged in its favour is that it is easily divided by two. If a standard illuminating power is required, let 10 candles be the parliamentary limit, and let the gas be correspondingly reduced in price. We hope that those who have been advocating a 16-candle standard will not further continue this advocacy. Although we do not think that the proposition of a 16-candle standard finds favour with the Committee at present considering the standard of light, it is well that the possibility of a reduction in the parliamentary limit in London, which is at present exceptional, should be remembered. Apart from the pecuniary profit which would accrue from a municipalization of the gas supply, and a corresponding diminution in the municipal rate, the service, when controlled by a representative public body, would undoubtedly be more efficiently carried out.

THE LONDON FOG AND WATER QUESTIONS.

At a Meeting of the Sanitary Institute held last Wednesday in the Parkes Museum, Margaret Street, W., under the presidency of Sir T. Crawford, Dr. Louis Parkes, Medical Officer of Health for Chelsea, and Lecturer on Public Health at St. George's Hospital, dealt with the above questions in a paper bearing the interrogative title of "The Air and Water of London: Are they Deteriorating?" He said that, with all its sanitary improvements, the air and water of London was undergoing continuous degeneration. Fog was not to be wondered at when it was considered that there were some 800,000 houses in London, each with half-a-dozen or more chimneys in communication with an open fireplace, and that about 7,000,000 tons of coal were burned annually in the Metropolis, or 20,000 tons per 24 hours—on a cold winter's day as much as 40,000 tons were said to be consumed—of which quantity 200 tons would escape into the air as fine carbon or soot, with probably an equal amount of sulphur as sulphurous acid. There were also produced something like 60,000 tons of carbonic acid to help to vitiate the air. Fogs, however, were but exaggerated types of what London air was throughout the whole of the winter months. As regarded the water supply of London, he was afraid people were working within a vicious circle. One of the special drawbacks of the Water Companies drawing their supplies from the Thames and Lea was the compulsion they were under to take in water when the river was in flood, owing to the insufficient capacity of their storeage reservoirs. All would agree that the supply of London, with its 4½ millions of inhabitants, ought to be independent of exceptional circumstances of all sorts. As a matter of public health, it was not a wise policy, and it was certainly not a scientific proceeding, to take in grossly polluted waters, such as were those of the Thames and the Lea when in flood, and then attempt to render them potable by storeage and filtration through sand and gravel. The endeavour was not always a successful one; and surely they had a right to ask that the water supplied to them for domestic purposes should be, like Cæsar's wife, above suspicion. In the remarks following the paper, Major Flower, the Engineer to the Lea Conservancy, expressed the opinion that the use of smokeless coal was one of the best solutions of the fog question, and that they could also do very much by applying chemicals. With regard to the water question, he was not of opinion that it would be necessary to go to the Welsh mountains for a supply; there was abundance stored in the bed of the Lea and in the Thames. What they wanted at once was to have inspectors of sources of supply appointed to prevent waste and pollution. Mr. Rogers Field agreed in recommending the use of smokeless coal. He moved a resolution expressing the opinion of the meeting that Parliament should withhold all appropriation of water-bearing areas in Wales or elsewhere until after the Royal Commission about to be appointed on the water question had reported. The Chairman stated that he agreed in the expediency of passing the resolution which had been proposed; and said he hoped the water of Wales would not be diverted before the report of the Royal Commission was published. The motion was then agreed to. Mr. Kenwood proposed that the subject of London fogs should also be inquired into by a Royal Commission. This was passed, and the meeting terminated.

With reference to the statement made by the reader of the paper noticed above, as to the Thames and Lea Companies being compelled, owing to the inadequate storeage capacity of their works, to draw water from those rivers in times of flood, Mr. I. A. Crookenden, Secretary of the East London Water Company, wrote to the paper which contained the report, denying, on the part of his Company, any such practice as that alleged against them, and characterizing as *brutum fulmen* the "alarming superstructure" built upon the assertion.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday at the Albion Tavern, Aldersgate Street, E.C.—Mr. FREDERIC LANE LINGING in the chair.

The SECRETARY (Mr. Magnus Ohren) read the notice convening the meeting; and it was agreed to take as read the report and the accounts for the six months ending Dec. 31 last. In the former, the Directors stated that the result of the working showed a balance to the credit of revenue account of £5476. The decrease in the profit on the half year, as compared with that of the corresponding period of 1890, was due to two causes—viz., the continued high price of coal, and the great falling off in the value of coke. The deficiency would, they said, be met by the balance brought forward from the previous half year, amounting to £6142, and by taking the sum of £2459 from the reserve fund. Having referred to the proposal to increase the price of gas to 2s. 9d. per 1000 cubic feet from the close of the present quarter, the report stated that the final call on the new ordinary 7 per cent. shares had produced £18,351. The whole of the shares were now paid in full; and the Directors would take power, under the Companies' Clauses Act, 1845, clause 61, to convert the share capital into ordinary 7 per cent. stock and consolidate the ordinary 7 per cent. stocks. The Directors recorded, with regret, the death of Mr. Charles Newton, one of the Auditors; and mentioned that Mr. A. G. Hounsham and Mr. W. Westcott were candidates for the office.

The CHAIRMAN said the results of the half-year's working were before the shareholders as represented in the accounts, which showed a balance of £5476. This, he need scarcely say, was very disappointing to the Directors; but it had arisen from circumstances in a very great measure beyond the control of the Board. One of the principal causes for their position at the present time was the depression in the value of coke and other residuals. As regarded coke, they had received £4252 less than in the corresponding period of 1890, and for sulphate of ammonia and ammoniacal liquor £623 less. Thus, in two items alone, they had lost a sum of nearly £5000. If they had received the same prices for residuals as in the December half of 1890, with the balance brought forward from June, and with the reduction they obtained on the last coal contract, the Directors would have undoubtedly realized their expectations. The depression in coke had been general throughout England. The reason why coke had been so depreciated was that the cement trade had been in a bad state for some time past. The cement manufacturers were the largest buyers of coke; and the lesson the Company had had lately showed that they would have some difficulty in disposing of the whole of the coke they produced if they had to depend upon the consumption for domestic purposes. The country had been passing through a very serious ordeal during the last two years. The gas companies, of course, had felt it very much; and when, from circumstances beyond the control of any management, they were compelled to increase the price of gas, they had those detractors, in the shape of critics, who at once flew out and said: "Here is a company raising the price of gas, while they are paying inflated dividends." Now they knew very well that gas companies did not pay inflated dividends at the present time; and these remarks, sweeping as they were, were extremely injurious to the gas interests. He took the opportunity of mentioning this, because the public would not take the trouble of ascertaining whether or not such remarks were true; they saw them in print, and accepted them. He did not call attention to this on behalf of their own Company, but in support of gas companies generally. In their own case, they were not under the sliding scale; but their capital was regulated by Act of Parliament. The £400,000 which they had called up was represented under three heads. There was only £75,000 at 10 per cent.; £275,000 at 7 per cent.; and £50,000 at 6 per cent. With regard to the last-named amount, they could have issued it at 10 per cent., and placed the money in the pockets of the shareholders. But the Directors some years ago thought it would be better to get the capital out at as low an interest as possible; and, with the sanction of the shareholders, it was issued at 6 per cent. They thus placed in the hands, or, he might say, at the disposal of the consumers £2000 a year; and this had been going on now for a considerable time. He thought this was pretty good evidence that the Company had not misapplied their capital. They had been in a position to supply gas at a very low rate. The time, however, had come—and the Directors regretted it beyond measure, but it was no use shirking the matter—when they had to state that, with the present cost of coal and labour, they could not supply gas at 2s. 6d. per 1000 cubic feet; and they had therefore given notice to increase it to 2s. 9d. from the close of the present quarter. The Directors felt assured that the consumers, knowing their feelings in regard to the question of price, would not make any objection; and from what he saw in the local papers, the expressions towards the Company were most favourable. Adverting to the capital, he said that it only realized £7 8s. 9d. per cent.; and this he believed the most critical authority would admit was not a very high rate, considering they were a manufacturing company. Buyers of gas property only obtained about 5 per cent. on their investment; and this could not be regarded as a very high rate, when they had their troubles and vicissitudes to meet, as they had on many occasions. This, he added, was the first time they had ever had to raise the price of gas since the Company had been in existence. Continuing, he said it was mentioned in the report, in reference to the amount of gas sold during the half year, that it showed a decrease when compared with the same period of 1890. But this was not a fair comparison, for this reason—that October, November, and December of 1890 would not apply to the same months of 1891. In the former period, the frost was extremely severe; the atmosphere was dull; and an immense demand for gas was made upon them. In the same months of last year, the weather was mild and light; and the consequence was that the requirements of the consumers fell off. But if they carried the comparison to 1889, then it would be found that they had in favour of the past half year an increase of nearly 30 million cubic feet in the quantity of gas sold. This showed that they were not standing still, but were very progressive. He was happy to be able to report that the assessments were now all settled; and he supposed they ought to consider they had been favourably arranged—at all events, they were obliged to be satisfied with them. As regarded the additions to the plant, he made allusion to the subject at the last half-yearly meeting; and he might now remark that they were nearly finished, with the exception of the gasholder, which they hoped to have in their possession in a short time. In the notice calling the meeting, reference was made to the capital, in connection with which the Directors wished to ask the shareholders to grant them further powers. The matter stood thus to a certain extent: They possessed £125,000 of 7 per cent. stock, and £150,000 of 7 per cent. shares; and, at a subsequent stage of the meeting, he should submit a resolution empowering the Directors to convert the shares into stock, so as to consolidate the 7 per cent. capital into one stock. The Directors proposed this because they believed it would be in the interests of the shareholders, as it was rather awkward in Stock Exchange transactions to have two separate 7 per cents. As to the details of the working, the Chairman stated that, under the head of coal, they had saved £3438 (which, however, was not so much as they expected); and in purification, £242. He came to an item which was very large, and which he regretted very much—that was, the renewal of works, retorts, and other things; and here they had an increase of £1278. This was a very large advance; but charges of this kind could not be regulated half year by half year. They must at times vary; and, unfortunately, the item had increased when the Company could least bear it. In other respects, on the debit side of the account, there was nothing on which he need comment. Having stated that the gas-rental had decreased by £538 when compared with the corresponding period of 1890, he said he had, with great regret, to call attention to another matter. Since it had been his privilege to occupy the chair, he had made a point of communicating to the shareholders everything he thought would be to their interests—he had never offered the least reticence. If things were good, the shareholders had known it, and if things were bad, he had never attempted to hide them; and he should pursue the same principle now. Painful as it might be, he had to inform the shareholders that their engineering arrangements had not been of the satisfactory character that they certainly expected. They had used nearly 2000 tons more coal than in the corresponding period of 1890, and yet the revenue was reduced, and there was a decrease of 3,680,000 cubic feet of gas sold. They had only sold 8814 feet per ton of coal carbonized; while the amount ought to have approached 9500 feet. Their Engineer (Mr. Gandon), who had held his position for a good many years, had been singularly fortunate in his management. The gas unaccounted for had been 5, 5½, and 6 per cent. at the outside; but, at one fell swoop, he had to contend with 10·56 per cent. These were results he could not hide. They had come upon the Engineer with great suddenness; and he was certain, from what the shareholders knew of him, they would feel how much he regretted it. He would ask him to give some explanation of these matters later on, so that the shareholders might know there was nothing materially wrong in the management. The Chairman concluded by moving the adoption of the report.

Mr. GEORGE LIVESEY, in seconding the motion, said with regard to the increase in the charge for gas, that—having the reserve fund full, and as the prosperity of the Company required it—they had reduced the price to the consumers year after year, until at last adverse times had come upon them. They had no margin and no possible savings; and the Directors had therefore been under the necessity of increasing the price of gas, in order to pay their way. The Chairman had stated that the average dividend was £7 8s. 9d. per cent.; but during the past half year, they only earned 3 per cent., and in the previous half year 2 per cent. They had therefore been using up their reserves for the benefit of the consumers; and, having at last come to the point when they could not use them any further, they found it imperative to call upon the consumers to bear a portion of the burden. He thought it was only right to tell the shareholders that they did not expect in the present half year to come out level, seeing that they had only raised the price of the gas from March, and consequently they would only get the increase during the summer quarter, besides which the high price of coal would continue through the greater part of the half year. In the December half, however, they had good hopes of coming out level, or very nearly so—at any rate, they would not have to dip largely into the reserve fund. The Chairman had stated with regard to the additional quantity of coal carbonized that it was 2000 tons; but the figures, to be exact, were 1829 tons. It was unaccountable to him, as it was to every one else, how it was that the unaccounted-for gas had gone up to the extent it had. In 1890, the average was 5½ per cent.; and in 1891, 9½ per cent. Taking the figures for each half year: In the first half of 1890, it was 4·9 per cent.; in the second, 6·2 per cent.; in the first half of 1891, 8·9 per cent.; and in the second half, 10·5 per cent. There was only one way in which he could account for a considerable portion of this. He firmly believed the gas was not made—that, in fact, since the advent of the Gas Workers' Union, the stokers had not worked nearly so well. Complaints to this effect were made to him by managers in different parts of the country. The principle on which the Gas Workers' Union acted was to reduce the amount of work done by each man as much as possible, in order to increase the number of men employed. He believed, in the case of every company that came under the baneful influence of the Union, that the men did their work in a worse manner; and he thought it was quite possible that, though they were now comparatively free from the hands of the Union, still the system they inaugurated had been to some extent continued. The Directors were quite aware of the difficulties in which the Company were placed at the present time; and they would do everything they could to remedy the defects—at any rate to try to find out how it was the unaccounted-for gas had gone up to the present point. As to the relation of the sale of coke to the cement trade, he might add to the Chairman's remarks that he had some figures shown him a few days since comparing the quantity of cement imported into New York during the last decade. Ten years ago the imports from England and other countries—Germany, Belgium, and France—were about equal—140,000 packages or barrels. This went on neck and neck, as it were, until, four years ago, it came to 500,000 from England and 490,000 from other countries. And what was it now? The imports last year amounted to 900,000 from foreign countries and 300,000 from England; so that, while they were about level four years

ago, New York now took three times as much cement from foreign countries as they did from England. This happened just when coke rose so materially in price in this country. The cement makers had had to pay 50 per cent. more for coke; and this no doubt had been the crippling factor in decreasing their business. Gas companies were at the present time face to face with further difficulties in regard to coal; but he did not anticipate there would be much to fear on that ground. The price was falling considerably; and the Directors therefore hoped, when they next met the shareholders, they would be able to tell them they had overcome their difficulties, and were returning to the ordinary prosperity of the Company.

Mr. CORBET WOODALL observed that, in common with others, he had noticed a reduction in the returns from the coals used; and it occurred to him there was another explanation besides that which Mr. Livesey had given. It seemed to him that, coincidently with the increase in the cost of coal, there had been (he had heard of it not only in one place but in many) a distinct reduction in the quality of the coal. It was not quite fair, he thought, to put the whole burden of the blame in a matter of this sort on the men. A large increase of the cost of the coal—much the greater proportion, in fact—had gone into the pockets of the owners of the collieries; and he did think they were honourably bound to give a quality of coal equal to that which gas companies were receiving in the days of lower prices, and therefore they ought, although it might involve a larger expenditure, to see that the coal was sent out in a proper, and not dirty condition. It seemed to him that the Engineer of the Company, as well as of many other companies, was put into the position of the men who had in the olden times to make bricks without straw; and it was impossible for them to keep up results if the coal was not in an equal condition to what it was previously. He believed his view of the matter was supported by this fact—that not only had they used this extra coal in order to make the same amount of gas, but they had consumed a considerably larger quantity of fuel to heat the retorts. About 1000 tons of coke had been consumed in excess of that used in the corresponding period of last year; and this pointed to the fact that the coal had not been yielding so well. There was one good thing that came out of these bad times—that was, that little matters were now receiving an amount of attention from those who had the management of gas companies which, in the halcyon days, when dividends were earned and large sums were carried forward to the undivided balance, hardly called for attention at all. He congratulated the Directors that they had delayed the increase in the price of gas as long as they had done. It was only in 1889 that they were able to put something by for a rainy day; and it would have been foolish to have raised the price earlier.

Mr. GANDON said he was afraid the Chairman had given him a somewhat difficult task to carry out; and he must confess that he was utterly unable to explain satisfactorily the reason for the large increase in the unaccounted-for gas. Mr. Livesey had suggested that part of it might be due to the inferior labour they had now; and Mr. Woodall had hinted that the quality of the coal was not the same as in times past. He admitted that they suffered from both these causes; but, to his mind, they did not explain the large increase in the unaccounted-for gas, because a certain quantity of gas had been measured into the gasholders. Therefore it was not that the gas had not been made, as it had been sent into the holders—of course, presuming that the meters through which it was measured were correct. He might say that they had had their four station meters tested by the makers last year; and they had themselves checked them by comparing the quantity of gas they were registering as indicated by the rise and fall of the holders, and, so far as he could see, there was nothing to show that the meters were working inaccurately. Therefore he could only imagine that the gas had gone in some way in the district. They were cudgelling their brains to find out the cause; and he wished he could say they had arrived at some definite conclusion in regard to it. There were, however, one or two causes from which they had suffered. They had been laying a considerable mileage of large mains; and in work of this nature, a considerable amount of gas was always lost. They had also had a mishap with one of the holders; but he could not say this accounted for the whole of the difference. They were now searching all over the district to find out any defects there might be in the distributing plant; and he was in hopes of being able to show a better result in the present half year. This was a matter which had caused him great uneasiness; and the sooner he saw an improvement, the more comfortable he should feel. There was one point on which he should like to correct Mr. Woodall. He had stated that the fuel account was very heavy compared with the corresponding half of 1890. In that period they used as fuel 71,960 gallons of tar, and therefore they burnt less coke; so that really the fuel account was now much the same as it was then. The Chairman had referred to the item of maintenance of works and retorts, which had been unusually heavy this year. Everything seemed to fall together. Their locomotive had to be repaired at a cost of nearly £400; and they had to put in two new boilers to replace others that were worn out. Another defect in the working was the increased quantity of coal that had been used; and this, to his mind, must be looked into in connection with the unaccounted-for gas. He assured the shareholders that he felt as dissatisfied with the results of the half year as he well could do; and he should do the best he could to bring about an improvement.

The motion was then carried unanimously.

On the proposition of the CHAIRMAN, seconded by Dr. HETLEY, a dividend for the past half year was declared at the following rates per annum—viz., 6 per cent. on the preference stock, 7 per cent. on the ordinary 7 per cent. stock, 10 per cent. on the ordinary 10 per cent. stock, and 7 per cent. on the new ordinary 7 per cent. shares, all less income-tax.

The retiring Directors (Mr. G. Livesey and Dr. Hetley) having been re-elected, the next business was the appointment of an Auditor to fill the vacancy caused by the death of Mr. C. Newton.

Mr. CORBET WOODALL moved, and Mr. ROBERT MORTON seconded, the election of Mr. A. G. Hounsham; and Mr. J. HILL proposed, and Mr. C. H. SHOPPEE seconded, the appointment of Mr. W. Westcott.

The result of the voting, with the proxies sent in, showed that Mr. Hounsham had received 21,654 votes, and Mr. Westcott, 15,395 votes; and the CHAIRMAN declared that the first-named gentleman had been elected.

A good deal of discussion between Mr. Westcott and the Chairman ensued, arising out of a request by the former that he might be furnished with the number of shareholders, apart from the Directors, who had voted in his favour, but the information was declined.

Mr. HOUNSHAM having thanked the shareholders for electing him,

A resolution was passed, on the motion of the CHAIRMAN, seconded by Mr. HORATIO BROTHERS—"That the new ordinary 7 per cent. share capital be converted to ordinary 7 per cent. stock, and be consolidated with the existing ordinary 7 per cent. stock."

Mr. BROTHERS, in proposing a vote of thanks to the Chairman and Directors, referred to the question of the unaccounted-for gas; expressing the opinion that the gas could never have been made, and that there was something wrong with the registration.

Mr. MORTON seconded the motion, which was unanimously agreed to.

A similar compliment was paid to the Auditors and officers of the Company; and this was responded to, on their behalf, by Mr. ALFRED LASS, F.C.A.

The proceedings then terminated.

THE GAS-WORKS PURCHASE QUESTION AT BIDEFORD.

The Bideford Town Council met last Wednesday—the Mayor (Mr. R. Dymond) presiding—to receive the reply of the Gas Company to the offer to purchase the gas-works by valuation in the usual way. The communication consisted of the minutes of a special meeting of the Directors held on Feb. 29, when it was resolved that the Council be informed that the Board had no power to enter into a sale of their works without obtaining the consent of the shareholders; that a meeting of shareholders would be immediately convened, and held on the 12th inst.; that the Directors would recommend to that meeting the following basis of settlement, it being distinctly understood, however, that the Company would proceed with their application for the Provisional Order: "That a contract be entered into for the sale of the works at a price to be fixed by two arbitrators and an umpire; that in estimating such price the arbitrators and umpire take into consideration the expenses the Company have been put to in applying for the Provisional Order, and allow the Company such a sum as they might consider fair for what virtually amounted to a compulsory sale; that the purchase be completed from Midsummer next, or such other day as might be decided upon; that all questions be finally decided by the arbitrators and umpire; that in the event of the sanction of the Local Government Board not being obtained, and the contract not being completed by the time agreed upon, that the Local Authority pay all the costs incurred by the Gas Company in applying for the Provisional Order, and in connection with the negotiations." As time pressed, the Directors suggested that the Town Clerk should prepare a draft contract; and, having obtained the sanction of the Council to the same, should submit it to the Directors in time to be laid before the shareholders at their meeting. The report of the Sub-Committee of the Council recommended the Council to inform the Solicitors to the Gas Company that the Town Council would adhere to the former resolution adopting arbitration, upon the terms suggested by the Directors in December last. Mr. T. Pollard, in moving the adoption of the report, said they repudiated the suggestion that there should be compensation for compulsory sale. It was the Company who originally insisted on arbitration; and the Council agreed to that course, and meant to adhere to it. The Company declared their intention of proceeding with their application for a Provisional Order; and he therefore thought the Council should send copies of all correspondence and resolutions passed to Major Marindin, who held the inquiry recently on behalf of the Board of Trade (see *ante*, p. 452), in order that he might see exactly what the Council were doing. This would strengthen their opposition to the Gas Company. Mr. Hookway seconded the motion. Mr. Ascott thought it ridiculous that the Company should clamour for compensation. Several other members concurred in this opinion; and the motion was carried *nem. con.* The following resolution was also agreed to: "That in the letter to Major Marindin, with copies of the proceedings of the Corporation relating to the negotiations for the basis whereon to found a contract for the purchase of the Gas Company, he be informed that failing negotiations the Town Council intend seriously to take into consideration and to adopt the lighting of the town by themselves; and, therefore, that the Town Council are more than ever convinced that the only practical way of settling this question is to take into their own hands the management and control of the public lighting of the town. And that the terms named by the Company for handing this over to the Corporation will be seen by him (Major Marindin) to be framed in such a manner as to render a settlement almost impossible; the only equitable way appearing to be that named by the Company themselves on Dec. 24 last, and which the Council have since adopted."

The Quality and Price of Gas in Melbourne.—Great complaints are being made at the quality of the gas supplied in Melbourne, especially in view of the fact that, at the recent meeting of the Metropolitan Gas Company, a dividend of 21 per cent. was declared and the charge for gas raised. Amidst the general dissatisfaction which prevails, there is heard a proposal to form an anti-gas league, the members of which will, as far as practicable, burn only mineral oil.

Increased Demand for Gas-Stoves.—The *Financial News* says: "It is an ill wind that blows nobody good, and the coal panic has caused a large influx of customers to the gas companies. Never has the demand for gas-stoves for cooking and heating purposes been so great as during the last few days. Of course, if the price of coal continues to go up, the price of gas is bound to follow. But, once in, the gas-stoves will, no doubt, stay; and the gas companies will thus secure a permanent increase of business in a department to which they are wisely devoting a good deal of energy just now."

PROVINCIAL GAS COMPANIES.

From the financial statements and reports of meetings which have reached us during the past week, the following particulars relating to Provincial Gas Companies have been extracted.

A very satisfactory account of the year's working of the Cheltenham Gas Company is given in the report presented at the recent annual meeting. The Directors stated that the higher cost of coal had been met by an unprecedented increase in the consumption of gas and the improved receipts from the residual products. The Company have done well in the matter of the sale of coke; the amount received exceeding one-third the expenditure on coal. For domestic use the sale of coke as a fuel has been much cultivated by the Company; and sulphate of ammonia has been sold at very remunerative prices. The full statutory dividends were declared.

The report presented by the Directors of the Dover Gas Company to the shareholders at the ordinary general meeting on Monday last week was very short. In the half year ending Dec. 31 last, there was a slight increase in the consumption of gas; and the profit realized was sufficient to pay the full dividend of 7½ per cent., and leave a few pounds in hand. The total receipts from all sources amounted to £16,384, of which £12,431 was for gas; and of the £13,672 expended, £7375 went for coal, £2909 for repairs, and £1140 for wages. The Chairman (Mr. W. Mannering), in moving the adoption of the report, said the accounts showed an increased revenue of £189 as compared with the latter half of 1890; and although the total expenditure had been £203 more, coal really cost less by £539. Repairs, &c., including labour, were more by £742. During the half year, 8045 tons of cool were carbonized, or 46 tons less than in the corresponding half of last year. The quantity of gas sold was 80,691,000 cubic feet, as compared with 79,790,100 cubic feet, or equal to 10,030 cubic feet per ton of coal. He expressed pleasure in again testifying to the efficiency of the staff. He said that a more able, willing, and painstaking body of officers and men could not be found; and they well deserved the best thanks of the proprietors for their continued faithful services. The motion was carried: and the proceedings closed with a vote of thanks to the Chairman and Directors.

The annual meeting of the Goole Gas and Water Company was held last Friday week. The Directors' report showed that, after providing for interest on loans, amounting to £473, and the payment in July last of an interim dividend at the rate of 4 per cent. per annum (which absorbed £900), there was, including £454 brought forward from the previous year, a disposable balance of £3159. The Directors recommended that a dividend be paid at the rate of 8 per cent. per annum for the past half year, which would, including the income-tax, require £1800, and make a dividend of 6 per cent. for the year. The report was adopted.

The half-yearly meeting of the Lewes Gas Company was held last Friday week. In submitting the accounts for the six months ending Dec. 31, the Directors stated that the revenue account showed a profit of £1450; and after providing for interest on mortgages, &c., the balance of net revenue was £1958. The Directors recommended that a dividend of 5 per cent. be paid, amounting to £1310, and leaving a balance of £648 to be carried forward. On the motion of the Chairman (Mr. J. Broad), the report was adopted, and the dividend declared. A special meeting was afterwards held, at which the Directors were authorized to re-borrow by statutory mortgage, the sum of £1450, to meet the requirements of the Company on capital account.

The report of the Directors of the Milnrow Gas Company shows a profit on the past half year of £681, which is, however, reduced on the profit and loss account to a disposable balance of £605, out of which the Directors propose the payment of the usual 8 per cent. dividend, which will absorb £600. The income from gas and meter rents was £1854; and from the sale of pitch, coke, oil, and ammonia, £340.

The annual meeting of the shareholders of the Redcar and Saltburn Gas Company was held last Saturday week. The balance-sheet, which was of a satisfactory nature, was adopted; and a dividend of 5 per cent. was declared, making, with the interim dividend paid last half year of 3 per cent., 8 per cent. for the year. Since the reduction in the price of gas three years ago, the annual consumption has risen from 19 million to 32 million cubic feet; and the number of consumers has doubled. The report and accounts were adopted; and a special resolution was passed authorizing an issue of £4000 of capital in shares.

In anticipation of the annual general meeting of the Sheppy Gas Company, to be held to-morrow, the Directors have issued the report and accounts for the past year. The former, which is signed by the Secretary (Mr. A. W. Marks), opens with the satisfactory statement that the quantity of gas supplied during that period was 3 million cubic feet more than in the preceding twelve months. This was the largest yearly increase yet shown; the average during the past ten years having been a million cubic feet per annum. This result is a proof of the growing appreciation of the use of gas for lighting, cooking, and heating purposes. The plan of fitting up houses for the use of gas, and also the supply of cooking and heating stoves, on the three years system, is very popular. This has been one means of inducing a larger consumption of gas, by securing new customers. At Sheerness, as elsewhere, trouble is caused to the Company by the use of the steam-roller. Not only has the loss of gas by leakage from broken mains and services been considerable, but the expenditure in repairs thereby entailed has been heavy. Besides the actual waste of gas, in several instances there was risk of serious accident. The coal contract for the year ending June 30 next was effected at an advance of 2s. 3d. per ton; but owing mainly to the increased use of gas, this additional outlay has not reduced the profit on the year's working so seriously as was anticipated. The return for residuals was better; and this helped to compensate for the higher cost of coal. Further capital expenditure is contemplated, to meet which a call is to be made on the "C" shares. The accounts accompanying the report show that 46 million cubic feet of gas were sold last year for private consumption, and 200,000 cubic feet for public lighting, producing £7057; the sale of residuals realized £2021; and the total receipts were £9781. Of the £6597 expended, coals cost £3461; and wages came to £769. The balance available for division is £2263; and the Directors recommend the payment of full dividends. The quantity of coal and cannel carbonized was 5074 tons; the residuals being 5125 chaldrons of coke, 50,233 gallons of tar, and 111,500 gallons of ammoniacal liquor.

The half-yearly meeting of the Sutton Gas Company was held recently—Mr. C. R. Mead presiding. The report of the Directors stated that, owing to the mildness of the winter, as compared with that of 1890, the consumption of gas had fallen slightly. The receipts from gas amounted to £6102, and from residuals to £1545; showing a profit, after meeting expenses, of £2087. The maximum dividends of 10 per cent. on the original stock, and 7 per cent. on the additional capital were declared, leaving a balance to be carried forward on the profit and loss account of £2896, and on the reserve fund account of £5398.

HALIFAX CORPORATION GAS AND WATER SUPPLY.

Local Government Board Inquiry.

A Local Government inquiry was held last Thursday week at Halifax, by Mr. T. Codrington and Mr. E. P. Burd, into an application by the Town Council for a Provisional Order, required for the purpose of amending the water charges, and also for increasing the borrowing powers of the Gas Department.

The TOWN CLERK (Mr. Keighley Walton) explained that the amended water charges were desired in order to do away with certain existing anomalies by graduating the prices. Some of these he pointed out—mentioning, for instance, that persons rated at £20 and £30 rental actually paid less at present than those rated at £19 or £29. With regard to the gas-works, he informed the Inspectors that the consumption of gas (which amounted to 72 million cubic feet in 1861) had increased enormously; the consumption last year reaching 539 million feet. The capital expenditure per million feet, on the other hand, had decreased from £1266 in 1861 to £618 in 1891. There had also been a considerable alteration in the prices charged for gas. In 1861 it was 4s. for the town and 5s. for the out-districts; and last year 2s. 2d. and 3s. 2d. respectively. The increased borrowing powers required, the Town Clerk added, were for £100,000. Of this, £17,655 referred to the purchase of land needed for the extension of the works; £11,988, to workshops, offices, &c., to be erected upon it; £30,356, to new retort-houses, &c.; and £40,000, to extensions of mains, &c., connected with the present property. The land, he explained, had been purchased at different times during the past eight or nine years.

Mr. BURD asked if the Gas Department had exhausted their present borrowing powers?

The TOWN CLERK stated that they had expended £953 beyond their powers; and this formed part of the cost connected with the recent enlargement, at a cost of £7000, of the Stoney Royd Gas-Works. He further mentioned that it was hoped the new works would be entirely completed before 1896.

Mr. *Brook*, the Chairman of the Gas Committee, said they were now at the far end with regard to meeting the demands upon them.

Mr. BURD inquired how it was the Corporation had not made application before this?

The TOWN CLERK said that the former Engineer submitted a report two years ago, stating that the Corporation would have very great difficulty in lighting the town during the following winter, and there was some difficulty.

Mr. BURD said that was all the more reason why the Corporation should have made their application sooner.

Mr. *T. Holgate*, the Manager of the gas-works, explained that an expenditure of £1000 had been forced upon them in supplying Dean Clough Mills.

Mr. BURD went on to point out that some of the property required was proposed to be leased from the Railway Company. The Corporation might eventually be able to buy this property; and he asked whether, under these circumstances, they had not better provide for the purchase in their present application, so as to avoid the necessity of seeking another Provisional Order.

The TOWN CLERK said they had no objection to doing that.

The *Mayor* said he certainly thought it would be a good thing to make provision for the purchase; and he suggested that their application for additional borrowing powers should be increased by £20,000.

The INSPECTOR asked that the Town Council should pass a resolution on the subject. They would be unable, he said, to borrow the money without another inquiry; but the granting of the increased powers now would save the Corporation the trouble and cost of a further Provisional Order.

The Lighting Bill of the House of Commons.—While the electric light has been applied in the House of Commons at an annual cost estimated for the coming year at £1800, the gas bill increases rather than diminishes. Last year it was £3000; for the coming year it is believed it will not be less than £3200. There is some slight reduction on the bill for oil-lamps, which before the introduction of the electric light used regularly to amount to £2000 a session. Last year this charge was reduced to £1900; and it is hoped that in the coming year the amount will not exceed £1550. This, says the *Daily News*, is a beginning in the right direction; but a mystery still surrounds the oil-lamps.

New Joint-Stock Companies.—The London Leeds Stove and Deimel Light Company, Limited, has been registered with a capital of £25,000 in £1 shares, to acquire certain patents, patent rights, &c., relating to improvements in gas burners, stoves, &c., and to develop and work them. The Comet Lighting and Heating Syndicate, Limited, with a capital of £18,000, in £1 shares, is to carry into effect an agreement entered into between J. M'L. M'Murtrie and W. E. Smith of the one part and E. C. Kock, on behalf of the Company, of the other part, for the acquisition of certain patents relating to producing, dealing in, storing, using, and supplying liquids of every description for lighting, heating, and motive power.

ELECTRIC LIGHTING FATALITY AT CHATHAM.

On the evening of Friday, the 4th inst., a fatal accident, caused by electricity, occurred at Chatham. It appears that, shortly before six o'clock, the workmen of the Chatham Electric Lighting Company were summoned to the premises occupied by Messrs. Taylor, a firm of outfitters in the High Street, to remedy a defect in the electric lighting apparatus. While the Company's foreman (a man named Readwin) was in the cellar beneath the shop examining the fittings, he pulled one of the wires to see where the looseness was. In doing so, he slipped off the board on which he was standing, and, his hand and foot touching the wire, he received a severe shock. Attracted by his cries, a cutter named Jay, in the employ of the firm, with others, descended and removed Readwin to the shop, he having lapsed into a state of stupor. Shortly afterwards sparks were emitted by the transformer; and Jay, thinking the premises were on fire, rushed into the cellar with an iron bar, saying he would beat the fire out. As he entered the cellar, he held up the bar in a striking attitude, as if to beat out the flame; but immediately afterwards dropped it, and fell back into another man's arms. He was removed from the cellar, and died in five minutes. At the investigation into the matter held by the Coroner for Kent (Mr. W. J. Harris), on the following Monday, at which Major Cardew was present, as representative of the Board of Trade, Dr. Walter Buchanan stated that he had made a *post-mortem* examination of the body, assisted by three other medical men; and they found all the principal organs in a deeply congested condition, and the blood had turned black. Death was due to asphyxia; and the appearances were entirely consistent with death from an electric shock. Mr. Albert Maund, an electrical engineer, stated that he examined the wires and transformer immediately after the accident, and found that there was no insulation on one of the wires, except a slight covering of india-rubber. One of the primary fuses had melted; and, judging by the discoloration of the wall, there had evidently been some "sparking." After a long investigation, the jury returned the following verdict: "The jury are unanimously of opinion that the deceased came to his death through an electric shock by misadventure; and in their opinion greater care should be observed by the Electric Lighting Company in providing switches to turn off the current from the various circuits of wires as occasion requires, and that they should strictly prohibit workmen from executing repairs while the current is on." The man Readwin is lying in the local hospital in a precarious condition; and it is feared that it will be necessary to amputate his hand and foot.

The following version of the occurrence is given by the *Builder*, as the result of special inquiries made to ascertain the real facts of the case: "Messrs. J. W. Taylor and Co., on whose premises the accident occurred, being unable to get any light, complained to the Chatham Electric Light Company, who sent Readwin to see what was the matter. During his investigation, he caught hold of one of the leads coming from a high-tension fuse. One of his feet was on the wet floor of the cellar, and he had omitted to put on his insulating gloves. The covering of the wire was moist; and sufficient current passed through his body to give him a severe shock, and cause him to fall to the ground. In doing so, he jammed the wire between the fuse-box and the cellar wall. Readwin has blistered his hand and foot; but he appears to have received no serious injury. The leakage from the wire to the wet wall was great enough to make the insulation smoke. Jay heard of this, became wildly excited, and rushed to the cellar with an iron rod, intending to beat out the supposed fire. He was followed by a companion, into whose arms he fell senseless while still several feet from the apparatus—dying a few minutes afterwards. Readwin deserves as much sympathy as a gas-fitter who, called upon to stop a gas leak, takes a naked light into a room filled with an explosive mixture of air and gas. The verdict of death by electricity through misadventure, returned by the Coroner's jury, is not to be wondered at; but, in view of the facts that Jay was several feet from the apparatus when he fell insensible, that his body showed no marks of any burn, and that the doctors who gave evidence were not familiar with the signs of death by electricity, we shall be strongly of opinion, until further evidence is produced, that his death was caused solely by excitement."

With the view of eliciting some authoritative statement from the Board of Trade as to their intentions in regard to the introduction of measures to prevent the recurrence of such fatalities as that above recorded, Mr. Patrick O'Brien had a notice on the paper of the House of Commons last Friday to ask the President of the Board whether his attention had been called to the accident, and to the censure of the Electric Light Company by the jury for not having provided proper switches to turn off the current from the wires while repairs were being executed; also whether, in consequence of these cases, and the great dangers experienced from electricity in America, as shown by the correspondence, which had taken place between the Foreign Office and the Board of Trade, he would take steps to induce or compel electric lighting companies and others to adopt every possible safeguard for human life. The question was, however, postponed till last night.

Longtown Gas Company.—Mr. Wilson, a local gentleman, has been appointed Secretary of the Longtown Gas Company, in succession to the late Mr. Dixon.

Waller's Patent Combined Exhauster and Gas-Engine.—In the paragraph on this subject which appeared in the JOURNAL last week (p. 436), the capacity of the exhauster attached to the 1-horse gas-engine was inadvertently given as 500 instead of 5000 feet per hour. With the lower quantity, a ½-horse engine would, of course, be sufficient.

Strike at the Leicester Corporation Gas-Works.—A number of the general labourers employed at the Aylestone Road Gas-Works of the Leicester Corporation struck work on Monday of last week. They applied for an increase of ½d. an hour some time ago; but the Gas Committee refused the advance. A second application was made a few days since; and, on this being refused, the men, to the number of about 50, struck. Little inconvenience was caused at the works, as their places were quickly filled.

THE BIRMINGHAM CORPORATION WATER SCHEME.

In our "Parliamentary Intelligence" to-day will be found a report of the proceedings in the House of Commons, so far as they have gone, on the Bill promoted by the Corporation of Birmingham to increase the water supply of the city by drawing upon the sources of the Wye. As our readers are aware, the project is viewed with a certain amount of suspicion by the Metropolis, inasmuch as it will, it is believed, interfere with the contemplated water scheme for London. But apart from this, it is encountering great opposition on all sides. There are some 30 petitions presented against the Bill, from Welsh and other county councils and local authorities, from landowners, owners of fishing rights, and a certain number of Birmingham ratepayers and water consumers. Most of the petitions from Wales and the western districts deny the need of any extended water supply for Birmingham, or affirm that sufficient water can be found in her own district. The petitions group themselves into a few broad divisions. First, there are those presented by owners whose property is to be acquired under the scheme; and to support the proposed acquisition Birmingham will have to prove such urgency as to justify compulsory sale, if purchase by agreement cannot be effected. Secondly, there are the claims of owners and public bodies along the line of route, from whom way-leave has to be obtained. Given the proof of necessity, these are, of course, persons to be settled with by arrangement. Next come the claims of owners of fisheries; and then the petitions of the railway companies whose lines may be interfered with. Further, there are the petitions of the Corporation of London and the London County Council, asking for the postponement of the scheme until a Royal Commission has reported. These depend upon the proof of urgency; and if this can be clearly shown, as the promoters think it can, the petitioners may abandon opposition to the preamble of the Bill, and ask for clauses to meet their requirements. The next division comprises the two Local Boards of Northfield and King's Norton. Last of all comes the petition of the ratepayers and others, whose *locus standi* before the House appears to be somewhat uncertain, seeing that they are bound by the result of the poll which sanctioned the promotion of the Bill. These petitioners make two assertions—viz., that the Welsh water is of inferior quality, and that a full and ample supply can be obtained by an extension of the present sources. This, of course, they will have to prove to the Committee who will consider the Bill.

The two vital questions in this matter are those of urgency and new sources of supply; and they are put by the *Birmingham Post* in the following form: (1) Is it a matter of urgent necessity; (2) Is it impossible to obtain an adequately extended water supply without going to Wales for it? The first contention, that of urgent necessity, will not, says the above-named paper, be disputed by anyone who knows the actual condition of the water supply, and the immediate prospect. A very few figures will demonstrate the case. The present area supplied from the Corporation water-works is 83,000 acres; there are in it 129,000 inhabited houses; the population is close upon 650,000; and the population now actually supplied is 548,000. This area is gradually filling up; the houses are becoming steadily more numerous, and the population is fast increasing. The demand upon the water supply is growing at a great pace. In 1876, when the works were acquired by the Corporation, the annual consumption was 3031 million gallons—a daily average of about 8¼ million gallons. In the year ending March last (1891), the annual consumption was 6141 million gallons; and the daily average nearly 17 million gallons. The present daily yield of the rivers and wells is 17½ million gallons; and by drawing upon storeage supplies from the reservoirs, this may temporarily be increased to 20¼ million gallons. At the present rate of increase of consumption, Birmingham will in 1893 be close upon the maximum yield. In 1900 she will consume nearly a million gallons daily in excess of the fullest present yield; and this excess will thenceforward rapidly increase. Consequently, in ten years from the present time the city will suffer from a water famine, unless the sources of supply are extended; and, as adequate works will take nearly, if not quite, ten years to construct, there is really not a day to be lost. This is confirmed by the experience of Manchester, which obtained its Thirlmere Act in 1887, and of Liverpool, which obtained its Vyrnwy Act in 1880; and neither city has yet obtained water from these sources. As to the possible local sources of additional supply, it is shown that it would be practicable to extend the reservoirs in the valley of the Blythe and the Bourne, and to sink more wells in the sandstone; but, as to the former plan, the cost would be heavy—probably a million, which would be ultimately thrown away—and, after allowing for extra compensation water, the increased storeage capacity (even if aided by fairly-yielding wells) could not possibly suffice for 20 years at most. There is a fatal objection to the extension of river supplies and the storeage of water so obtained—viz., that the rivers available run through highly manured and cultivated districts, studded with villages and farms, and consequently yield water liable to rapid deterioration in quality, and likely to be ultimately condemned as unsafe for domestic purposes. Being thus practically shut out from safe and adequate extensions of river supplies, the question arises, What can be done by means of additional wells in the sandstone? The wells yield so capriciously as to indicate that the sandstone is not an unfailing reservoir. It has been tested at various points, and this has been the result shown. It is found that continuous pumping at the existing wells diminishes their average yield, and that intervening wells are affected. These facts seem to prove that local sources of supply cannot be depended upon; and that the Corporation will be forced to go further afield for any additional water they require.

With regard to the position taken up by local authorities likely to be affected by the scheme, a few weeks ago there appeared every likelihood that the Wolverhampton Corporation would be an opponent of the scheme; but an amicable arrangement has been entered into, by which the Birmingham Corporation have agreed that, should the eventuality arise, the Wolverhampton Corporation will be permitted to tap one of the mains by which it is proposed to carry the water from Wales to Birmingham, and thereby serve Wolverhampton. This town and the district are now supplied from wells at Cosford; and, under the arrangements with the Birmingham Corporation, should

these wells run dry, they would have the option of taking a supply from the mains. Wolverhampton will therefore support the measure, as will also Worcester and Kidderminster, on condition that provision is made for local authorities within 15 miles of the aqueduct to have a supply of water therefrom.

LEICESTER CORPORATION WATER SUPPLY.

Proposed New Reservoir—Arbitration Proceedings.

Mr. R. Clutton, C.E., the Umpire agreed upon to hear evidence in the arbitration between the Leicester Corporation and the Earl of Lanesborough with respect to the price to be paid by the Corporation for land at Swithland required for a new reservoir, sat for that purpose at the Surveyors' Institution, Great George Street, S.W., on Monday, the 29th ult. Mr. Bidder, Q.C., and Mr. A. T. Toller appeared for the Corporation; the Solicitor-General (Sir E. Clarke) and Mr. Bremner represented Lord Lanesborough. In opening the case, the Solicitor-General stated that the land in question was required for establishing the Swithland reservoir for the purpose of supplying Leicester with water. In 1890, the Corporation obtained an Act authorizing them to construct new works; and there were provisions in it affecting the Earl of Lanesborough. The area of the watershed was 3500 acres, so that Swithland covered the larger portion of that area. The Corporation were proposing to take 225 acres of the estate, which, added to some 55 acres they had obtained from a neighbouring landowner, gave them the site of the reservoir. It had been shown by the Corporation themselves that this was a place of exceptionable value for a reservoir. The quantity of water that could be stored there had been put at 630 million gallons; and it would supply Leicester for some time to come with water of an exceptionally good quality. The effect of taking the 225 acres of land was that a piece was practically cut out of the middle of the estate, which was divided into two separate parts. The estimate they put upon the loss and injury Lord Lanesborough would sustain was £58,000 or £59,000. The estate was very attractive for sporting purposes; and its value for selling after the portion required had been taken away would be considerably lessened, besides which the drainage of the land around would be materially prejudiced. A new railway was to be brought very near to Swithland Hall, passing along some of the land which would remain to Lord Lanesborough, and also over a substantial part of the property which the Corporation were going to take; and it could not be denied that this proposal would induce the owner to refuse to sell the land at the price which he would if there was no likelihood of a railway coming within 10 miles of it. Concluding, he contended that something must be allowed for personal inconvenience to the vendor and expenses of living elsewhere during the progress of the work; and he thought £5000 would be a fair sum. The first witness called was Sir J. Whittaker Ellis, who expressed the opinion that the Corporation scheme would completely alter the character of the estate. He gave details of a calculation by which he arrived at £53,158 as the consequential damage by the Corporation to the property, to which he added £5000 for personal inconvenience and cost of another residence during the progress of the work, and £3000 as the value of the timber. Witness was cross-examined at considerable length by Mr. Bidder; and then Mr. Tewson (of Messrs. Debenham, Tewson, and Co.) gave evidence at some length, the substance of which was that he calculated the total sum to be paid by the Corporation to Lord Lanesborough at £58,546. Another of the witnesses—Mr. Oakley, a land surveyor, of London—estimated the total amount at £52,175, exclusive of the timber. The proceedings were continued on Tuesday; and Mr. Lofts, a land agent, gave evidence showing that the proposed works would destroy the estate as a residential property. Before the case for Lord Lanesborough closed, the Solicitor-General announced that they had agreed to a valuation of the timber at £2700. Mr. Bidder then called his witnesses; Mr. J. W. Beadel, M.P., being the first. He admitted that there would be a certain amount of severance of the estate, for which compensation should be paid. He also agreed that there would be some temporary inconvenience to the owner during the progress of the work, which must also be paid for. He thought, however, that, when the reservoir was completed and in good working order, it would improve the residential character of the estate rather than otherwise. Mr. J. F. L. Rolleston stated that, in his judgment, the reservoir would be no detriment whatever, but rather an improvement to the estate. He gave a number of figures, which, summed up, showed that he computed the amount to be paid to Lord Lanesborough at £17,622, or, with timber added, at £20,372. Mr. Goodacre, Mr. Vigers, and Mr. German also considered the reservoir would be an improvement to the estate; and the last-named witness allowed £17,131 as the total amount of the compensation. Mr. Bidder afterwards addressed the Umpire; being followed by the Solicitor-General, with whose remarks the proceedings terminated.

THE WATER SUPPLY OF BILSTON.

The Town Commissioners and the Wolverhampton Corporation.

A public meeting of ratepayers was held at Bilston last Wednesday to consider the water question, more particularly as to whether the Town Commissioners should conclude their negotiations for cancelling the subsisting agreement to take water from the Wolverhampton Corporation and construct water-works for the town at an estimated cost, including compensation to Wolverhampton, of £40,000. The Chairman of the Commissioners (Mr. T. Johnson) having briefly opened the proceedings, Mr. T. Holcroft said one of the questions that had to be settled was whether or not the Commissioners should proceed with their appeal to the House of Lords against the decision given in favour of the Wolverhampton Corporation.* If the Commissioners won, they would then not have to take the surplus water from Wolverhampton, who would have to pay the costs; but personally he was in favour of coming to reasonable terms rather than going to law. Two years ago, when the Commissioners went to Parliament with a view of securing powers to supply the town with water, a scheme was prepared which showed that the water could be obtained for 2½d. per 1000 gallons, as against 5d., which was now being paid to Wolverhampton. Mr. Baldwin Latham at that time estimated that the cost of obtaining a supply of 500,000 gallons per day would be £19,000. What it was now proposed to do was to put down plant to obtain 1,000,000 gallons a day; and, including £9000 which it was proposed to pay to the Wolverhampton Corporation to release the Commissioners from the existing agreement to take water from that body, the estimated cost was £40,000. If it was decided to apply for parliamentary powers, the Wolverhampton Corporation, for the payment of the £9000, would assist the Commissioners. The site of the water-works would be at Wombourne. It was proposed that powers should be obtained to repay the £40,000 in thirty years; and this would require £2200 a year. Adding to this £500 for pumping and distributing the water, the annual expenditure would be £2700; but as the receipts at the present time amounted to about £3400, this would give a profit of £700 a year on a distribution of about 400,000 gallons a day. The Commissioners would still have 600,000 gallons a day to dispose of; and if they could sell it at 4d. per 1000 gallons, a profit would accrue of between £4000 and £5000 a year. There was a good deal of discussion on the subject; and in the end a resolution was passed approving of the action taken by the Commissioners in their negotiations with the Corporation of Wolverhampton for cancelling the agreement for the supply of water to Bilston.

* See JOURNAL, Vol. LVII., p. 650.

Gas or Oil at Hucknall Huthwaite.—At a meeting of the Hucknal Huthwaite Local Board last Tuesday, further steps were taken to oppose the application of the South Normanton and Blackwell Gas Company for a Provisional Order; and instructions were given for several street-lamps to be at once experimentally lighted with oil.

The Electric Lighting Scheme for Antwerp.—The Communal Council of Antwerp have agreed to the proposals of MM. Moris and Van Rysselberghe in regard to lighting the city by electricity. The undertakers will have to pay down at once 500,000 frs. by way of security, and a similar amount before the expiration of six months. They are to furnish a supply of water at a pressure of 10 atmospheres to produce the current, and they may also supply electricity direct by means of underground cables. The municipal authorities may, within four years, call upon the concessionaires to provide electric lighting for the public thoroughfares on a descending scale, which will reduce the cost to *nil* in 25 years. In this event the concessionaires will not have to pay any tax to the city; and they will be allowed to employ overhead wires instead of underground cables.

Londonderry Gas Company.—The ordinary general meeting of this Company was held on Friday, the 4th inst.—Mr. R. W. Newton, J.P., in the chair. The Engineer and Secretary (Mr. J. Macnie, Assoc. M. Inst. C. E.) having read the notice convening the meeting, the report and accounts were presented. The Chairman, in moving their adoption, stated that, after providing for all expenses, there was an available balance of £4003, out of which the Directors recommended a dividend at the rate of 10 per cent. He alluded to the high price of coal and cannel; but stated that as there had been a large increase in the consumption of gas and a better return from residuals, he believed that all need for advancing the price of gas had been averted. Referring to the electric light, he said the shareholders were aware that the Corporation had obtained powers to supply electricity in the city, and that there was a movement on foot to put these powers into operation. However, unless the conditions of Londonderry were more favourable for the development of this source of light than those found in other towns where the light had been adopted, he believed the shareholders had no cause for alarm. He then went on to say that it was within the knowledge of the Directors that a desire to acquire the Company's business had recently been expressed; and if the Corporation, following the example of some other local authorities, wished to become owners of the works and to control the gas supply of the city, the Directors would be willing to consider any proposals made to them with this object in view. Mr. W. Tillie seconded the motion, and it was adopted. The retiring Directors and Auditor were then re-elected; and the proceedings closed with votes of thanks to the Directors and to Mr. Macnie for the attention they had given to the affairs of the Company.

Lecture on Coal Gas.—In connection with the Hexham Wesleyan Mutual Improvement Association, a lecture on "Coal Gas" was delivered on the 29th ult., by Mr. Herbert Lees, the Manager of the Hexham Gas Company. It was illustrated with models and diagrams. After giving the history of coal gas, and describing its manufacture, the lecturer remarked that whatever the future of electric lighting might be, there was not the slightest indication that it would ever seriously affect the consumption of gas. Its use was almost entirely confined to the houses of the wealthy, and the front premises of large business establishments. Gas had been, and would continue to be, the poor man's light—using this phrase in its widest sense; and they might rest assured that this class of people would always be with them. But the present use of gas was not by any means confined to lighting. As a cooking agent, it stood first and foremost; and no well-managed establishment should be without a gas cooker. It was cheaper, cleaner, and in every respect better than the coal range. Then there was the field for motive power for gas, which was capable of expansion in a variety of ways; not the least important of its uses in this direction being its application for the generation of electric light. As a ventilating agent, it was now extensively adopted with great success. A few years ago the great cry was for electric light in the streets; for outdoor lighting it was supposed to be infinitely superior to gas. This fallacy had been exploded long ago; but it was never more patent than during the very heavy fogs in London during Christmas week, when the superiority of gas for penetration was abundantly proved. In concluding, Mr. Lees showed the advantage, from an economical point of view, of using regulator burners. At the close of the lecture, which was most instructive as well as interesting, a hearty vote of thanks was accorded to Mr. Lees.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

I am afraid I cannot keep always drumming away at the common-stair lighting question; but for this week yet I must drag it in, because it has been made the subject of a judicial decision, and has been mentioned at meetings of two public bodies—the Town Council and the Trades Council. The judicial proceedings took place in the Small Debt Court. In this case, the pursuer, Mr. James Shaw, the owner of property in Buccleuch Street, claimed £12 from the Gas Commissioners as damages in respect of breach of contract, which he alleged the Commissioners had been guilty of in the cutting off of the gas in the stair. Along with the Gas Commissioners, there were also called as defenders the Town Council and the Inspector of Lighting; but the Gas Commissioners undertook the defence of the action, and the others were not represented in Court. Mr. Jack, the Clerk to the Gas Commissioners, conducted the defence; and he carried the war into the enemy's country by averring that there had been breach of contract on the pursuer's part, in paying for gas to be burned till 11 o'clock and allowing it to be used after that hour. In Mr. Jack's hands, the pursuer was made to admit that he had contracted for gas to be burned only till 11 o'clock, and that the Commissioners reserved power to cut it off if it was burned after that hour; and he also stated that when he received the first warning from the Gas Commissioners, he communicated it to his tenants. He believed that his tenants turned off the gas regularly, but that someone lighted it afterwards. There was no attempt, however, to prove that this had taken place; and the Sheriff dismissed the action, but without expenses—I suppose, because the Commissioners had practically incurred none, as their Clerk defended the action. His lordship, at the same time, took it upon himself to deliver a short homily on the subject, in which he stepped out of his sphere, and, I fear, talked without book. He said it had been stated that there were five tenants on each flat of the stair. It was quite obvious that some arrangement must be made between them by which the duty of turning out the gas should be taken in turns. It was quite possible that there was a hardship; but it was a matter that should be taken up by the public authorities. He could see that it was impossible to work out a system of that kind when it was left to a class of tenants such as those, who could not be got to do what was necessary as a matter of regular habit; and it would be necessary to adopt some system whereby the lamplighter or the policeman, or some independent person, would take in hand the extinguishing of the lights on such stairs.

At the Town Council, the subject was brought up by a deputation from the Social and Sanitary Society, who, headed by the Rev. R. Henderson, presented a memorial urging, in the interests of morality, that the time had come when the Corporation should take the lighting and extinguishing of lights in common-stairs into its own hands, and that the lights should be kept burning the whole night. Their method of doing the work was by the appointment of resident caretakers. Bailie Macpherson, as the Americans would say, fixed the memorialists with the question of who was to pay the caretakers; and all the reply he could get was that they left it to the discretion of the Council. The subject was referred to the Cleaning and Lighting Committee.

The Trades Council, a democratic body, were for exercising no discretion in the matter; but thought the cost of stair-lighting should be thrown on the rates. Even they, however, sent the subject to a Committee for consideration. With all this ado over a question which is purely one of administration, surely some solution of it will be arrived at which will give more satisfaction than the present method; albeit, it is to be observed, the present method works well enough in tenements where the people are honest, and that the relief which is proposed is for the benefit of those who are not honest.

Important extensions in the retort-house department of the Dawsholm gas-works have lately been resolved on by the Gas and Electric Lighting Committee of the Glasgow Corporation, and approved of by the Town Council; and it is thus seen that even the sanguine "electric lightists" of the Committee are of opinion that the days of coal gas are not yet numbered. At the end of January of the present year, Mr. Foulis submitted to the Sub-Committee on Works a plan showing certain extensions which he proposed to make in the retort-house and adjoining coal-store at the works named; and after the Sub-Committee had given consideration to the matter, they approved of the proposed extensions, and authorized him to prepare the necessary specifications and schedules for the work. The tenders have been received and were opened this week—six for the brickwork, masonry, excavations, &c., and three for the roofing and other ironwork. In the case of the former, the amounts of the tenders are said to range from about £7750 up to nearly £2000 more, from which figures it seems as if there had been a little "wild" tendering. The tenders sent in for the iron roofing, &c., were received from three well-known and old-established firms—the Barrowfield Iron Company, Messrs. P. and W. Maclellan, Glasgow, and Messrs. Hanna, Donald, and Wilson. It may be said that, roughly, the proposed extension works will not cost much short of twenty thousand pounds.

Mr. A. Smith, the Manager of the Aberdeen Gas-Works, has submitted proposals to his Committee for the improvement of the works, which include the removal of a small gasholder from the works to a site in the recently-acquired suburb of Woodside. There is at present a gasholder in the district; but the consumption is growing fast, and it is found to be difficult to send the gas from it down to the famous paper mills of the Messrs. Pirie, on the banks of the River Don. The new holder will be on the low level, and will provide for the additional demand of the district as well as for the better supply of the mills. The existing tank in the works will be retained and covered over to serve as a store for tar or liquor. Mr. Smith also proposes to remove the existing workshops to another part of the works, on account both of their present defective accommodation and the danger of fire which arises from their being situated quite close to the tar wells and other apparatus. On their site, he proposes to erect additional purifiers. The Gas Committee are to report on the subject.

The Police Commissioners of Inverness have lost no time in proceeding with the work of extending the gas-works after clearing away the electric lighting phantasy. They had before them on Thursday night offers for the construction of the tank and the erection of a new gasholder; and they resolved to accept that of the Thorncliffe Iron Works, Sheffield, the amount of which was £6180. For the erection of purifiers, the contract was given to Messrs. Ashmore, Benson, Pease, and Co., Limited, the amount being £999. Mr. Roderick Fraser, a local tradesman, has been selected to do the masonry and other work for £1112 15s. These sums amount to about £1000 below the estimate of Mr. Thomson, the Gas Manager. The Gas Committee had recommended that power should be taken to borrow £15,000; but, inasmuch as the cost of the new works had turned out to be less than was expected, and that they have still power to borrow to the extent of £3000, it was resolved to take powers for the borrowing of only £12,000. A Sub-Committee have been asked to consider whether it will be necessary to raise the price of gas; the feeling being that an increase might be made, particularly upon consumers outside the burgh boundaries.

A Police Bill is being promoted for Dundee this session; and at a meeting of the Police Commission on Thursday, the subject was raised of the desirability of amalgamating some of the public bodies in the city. There is at present a Town Council, a Police Commission, a Gas Commission, a Water Commission, and a Harbour Trust, all with different staffs—certainly a very costly method of conducting the business of a community. The Town Clerk ruled that it was now incompetent to insert a fresh clause in their Bill; but that power to amalgamate was proposed to be given in the General Police Bill for Scotland, which was expected to be passed by Parliament this session. There is a great anomaly in the constitution of the Gas Commission, in respect that the Chamber of Commerce, the Nine Trades, and the Three Trades, which are impecunious bodies, send representatives to it. It was pointed out that if the Gas Commission were to become bankrupt, those bodies who sent representatives to it had no funds, and it would be the ratepayers who would have to bear the burden. This is very true; and an amendment of the constitution of the Gas Commission can only be a matter of time.

At the ordinary monthly meeting of the Coatbridge Town Council which was held on Thursday last, there was submitted a report by Councillor Chisholm on the local Gas Company's accounts; and the calling for such a report would appear to indicate that the relationship between the Gas Company and the Town Council is still of a somewhat unfriendly character. The report stated that the accounts had been drawn up as usual in statutory form, and had been duly audited. During the year, an additional sum of £2000 had been borrowed on mortgage, raising the loan capital to £4000. On additions to plant, mains, and meters, there had been expended the sum of £1183; and during the year there was an increase of 3,270,000 cubic feet of gas sold, while the amount received for public lighting had been increased to the extent of £136. The total amount received for the sale of gas, public lighting, and rent of meters was £12,668; being an increase of £1950 over the income in the previous year from the same sources of revenue. (I may parenthetically remark that Councillor Chisholm's report does not take any cognizance of the income derived from the sale of coke, tar, and liquor.) The report goes on to say that the price of gas was raised 5d. per 1000 feet at the beginning of the year, and that, along with the larger sum received for public lighting, produced £1440, thus showing the natural growth of the revenue to have been £510. Dividends in full, less income-tax, had been paid. The additional sum realized by the increased price of gas appeared (to the reporter) to have been required to meet the increased cost of production, as the net amount at the credit of profit and loss account is £17 less than in the preceding year; but the amount was still £253 more than was authorized by Act of Parliament.

Tenders have been received this week for the central electric lighting station which the Glasgow Corporation have agreed to erect at the corner of Waterloo Street and Mains Street. Ten firms of local contractors have tendered for the excavation work, mason work, &c., and eight for the roofing and other ironwork. I need not go into any details with regard to these tenders; but I am informed that well nigh £10,000 will have to be expended upon the erection of the station as designed by the combined heads of Professor Kennedy and Mr. Foulis. Of course, the equipment in the shape of boilers, engines, dynamos, &c., is a subject for future consideration; but it certainly means an expenditure of a considerable amount more money.

The experiment now in progress in the town of Hawick in respect of street lighting by electricity, seems to have made some impression on the local "powers that be;" but whether or not it will lead to an extension of the use of electricity for that purpose instead of gas, is another question. At the invitation of the Town Council of Hawick, Mr. Henry A. Mavor, the leading member of the electrical engineering profession in Glasgow, is to give a lecture in the Town Hall on Monday evening, on "The Various Applications of Electricity to Public, Industrial, and Domestic Purposes." It is by Mr. Mavor's firm that the street-lighting experiment is being carried out; and I may mention, by the way, that there is some hope that local water power may eventually be utilized in developing the electrical energy required for the permanent lighting of the town by the new illuminant. It may be stated, however, that the Directors of the Hawick Gas Company have not got into a condition of fear and trembling over the prospect of the street lighting being taken from them. Still, there is room for believing that it might have been good policy for the Gas Company to have done something before this time, in the way of meeting the growing demand for the new illuminant in the headquarters of the Scotch hosiery trade—a demand which had already shown itself by some of the local millowners having started installations for themselves.

Projected Extension of the Hindley Gas-Works.—At the meeting of the Hindley Local Board last Tuesday, the Gas Manager (Mr. W. Dickenson) reported an increase of 887,800 cubic feet in the consumption of gas in the preceding four weeks, as compared with the corresponding period of last year; and he recommended that additional plant should be provided. It was resolved that he should sketch out the requirements of the gas-works and report thereon; and, further, that he should visit places where generator furnaces are in use, with the view of obtaining particulars as to their working results.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 12.

Sulphate of Ammonia.—A little more activity was noticeable at the beginning of the week, and a fair business resulted. But the market has once more become lifeless; and this is perhaps not to be wondered at, seeing the unsatisfactory surroundings. The again late season causes many of the dealers to resell the sulphate previously contracted for in anticipation of a good demand this month; and low prices have to be accepted for such forced sales. Then the speculators are assisting the market down by sending quotations about broadcast considerably under the already very low values; their action naturally causing the frightened consumer to halt for fear of paying even now too dearly for his nitrogen. Thus time drags on; and we are rapidly getting past the best part of the season. There is still ample opportunity for making up for lost time; but the improved demand must now come quickly and sharply. Meanwhile the speculators are leisurely covering in their short sales, and the stocks are not increasing. Hence the position in itself cannot be said to be any worse; and milder weather would no doubt speedily change the complexion of the market. Prices are still at £10 5s. Hull and Leith, and £10 2s. 6d. Liverpool. Nitrate—also suffering from the adverse season—is very slow at 9s. 4½d.

LONDON, *March* 12.

Tar Products.—With the exception of pitch, which is moving off briskly, and for which there is some inquiry for forward delivery, business in this market is as bad as it well can be. Benzols have lost the advance they obtained recently, and other products are practically unsaleable. Important contracts for tar have been booked at prices ranging from 12s. to 15s., which, in the present position of the market, is ample enough for it. Prices are: Tar, 12s. to 15s. Pitch, 30s. Benzol, 90 per cent., 2s. 3d.; 50 per cent., 1s. 8d. Toluol, 1s. 4d. Solvent naphtha, 1s. 3d. Crude benzol naphtha, 30 per cent., 11d. Creosote, 1d. Naphthalene salts, 25s.; pressed, 45s. Carbolic acid, crude, 60's, 1s. 0½d.; 70's, 1s. 4d. Crystals, 5d. Cresol, 8½d. Anthracene (30 per cent.), "A" quality (nominal), 1s.; "B" quality, 8d.

Sulphate of Ammonia.—There is no relief from the deep depression which seems to have settled down on this article. It is difficult to sell, and buyers are continually wanting lower prices. The little business that has been transacted has been done at £10 to £10 5s., less 3¾ per cent. discount. In some quarters, 2s. 6d. more is offered for forward delivery. Gas liquor, 10 oz., is quoted at 6s. to 7s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—During the past week, the coal trade of this district has been settling down again into something like reasonable condition; and the altogether unnecessary panic which so disorganized the market has completely subsided. The very general belief now is that the stoppage of the pits will not extend over a week; and this, so far as the miners of Lancashire are concerned, is confirmed by resolutions which have been passed at some of the district meetings of the Federation, to the effect that the delegates be instructed not to support anything beyond a full week's cessation of work, but to advocate a restriction of the output to five days per week during the summer. The pressure of demand for the better qualities of round coal has altogether disappeared; but colliery-proprietors are necessarily considerably in arrears with delivery on account of the orders already booked. With regard to the lower qualities of round coal for iron-making purposes, most of the forges are ceasing operations during the stoppage of work at the pits; and this is necessarily counteracting the temporary stoppage of supplies. With regard to engine classes of fuel, the pressure for extra supplies to carry works and mills over the cessation of work at the pits, has not shown so much abatement as in other descriptions of fuel; but with the large quantity of coal that has been recently taken out of stock, it is not likely that there will be any great scarcity of either burgy or slack. In fact, considerable stocks are still held at many of the collieries; and altogether there has been quite an unnecessary anxiety on the part of consumers, with regard to their supplies. Many of the principal firms have continued all along the supply of their regular customers at old rates; but in the open market, advances of 1s. 6d. to 2s. per ton upon round coals, and about 2s. to 2s. 6d. per ton on engine fuel, have been readily obtained, and still represent the basis of prices, which, however, can only be temporarily maintained. At the pit-mouth, current prices in the open market may be quoted at about 13s. to 14s. for best coals; 11s. to 12s. for seconds; 10s. for common coals; 8s. to 9s. for burgy; 7s. to 8s. for the best qualities of slack; and 4s. to 5s. for the inferior descriptions. The demand for shipment has not been out of the way; but with such high prices obtainable on inland sales, only limited quantities have been offering at the ports, and to secure supplies, special prices have had to be paid—11s. 6d. to 12s. 6d. having been readily obtained for steam coal, delivered at the High Level, Liverpool, or the Garston Docks.

Northern Coal Trade.—The coal trade in the north is now determined in its prospects by the decision of the Durham miners to strike; and the decision must greatly influence the gas-coal trade. Northumberland miners will continue to work on; and this will lessen the effects of the strike in Durham. Northumberland coal has, however, increased in price, best steam being now 11s. to 12s. per ton, f.o.b.; but prices will be influenced by the extent of the competition with Wales and Scotland. Small steam coal is firm, at from 5s. to 5s. 6d. per ton, f.o.b.; but the output in Northumberland will be large, and the consumption will be reduced by the closing of some works in the North. There are two or three gas-coal collieries in Northumberland; but their output is limited to the needs of the trade. Some sales have taken place of gas coal by one of these collieries at about 11s. per ton, f.o.b. in the Tyne—2s. 6d. above the price of three weeks ago; and it is certain that 12s. per ton is now asked, and may be paid in a few days unless the situation should be speedily changed. As to the duration of the strike, it is not expected that it will be prolonged; because it is known that the leaders of the miners are against it, and it is believed that the funds of the Union are not equal to the financial needs of the 50,000 members who are entitled to strike pay. There have been stocks of coal laid up in the last week to some extent; but there will also be a closing of iron-works, which will materially lessen the consumption. Durham produces on the average over 500,000 tons of coal weekly; and it is at once evident that there will be a serious effect from the stoppage, though there is no doubt that the output of Northumberland will be increased in some degree. This is the position; but it is quite possible that it may be altered by the meeting of the miners' delegates in London in a few days. Coke is steadier, especially blast furnace coke, which has been sold at 17s. per ton, f.o.b. in the Tyne.

West of Scotland.—The coal trade in this district is firm for prompt delivery; but there is comparatively little forward inquiry. Business with the Continent is at a standstill, foreigners waiting until the Durham miners come to some determination as to what course they will adopt. There is some uncertainty as to how the miners will act in the Slamannan district, owing to the action of the leaders, who, it was stated, were making arrangements to have the district picketed yesterday (Monday) morning. At a meeting of the Slamannan coal-masters on Wednesday afternoon, those present expressed themselves as still determined to resist the attempts being made to induce the men in that district to join the holiday movement. Apart from the strike difficulty, the outlook for the future is said not to be very cheering for the trade. Prices in Glasgow may be quoted: Main, 8s. 3d.; ell, 8s. 6d. to 8s. 9d.; splint, 9s.; and steam, 10s. 3d. to 10s. 6d. The shipments of Scotch coal for the past week reached a total of 117,428 tons, as against 115,564 tons for the previous six days, an increase of 18,642 tons. For the year up to date, the exports total 962,404 tons, an increase of 154,633 tons.

Messrs. Richmond and Co., Limited, have removed from their temporary premises in Basinghall Street, to No. 93, Cheapside, E.C.

Gas Exhibition at Newcastle-on-Tyne.—Encouraged by the satisfactory results of the exhibition held in September last, Messrs. Richmond and Co., Limited, of Warrington and London, have been holding another during the past fortnight in the Northumberland Hall, Newcastle-on-Tyne. Cookery lectures have been given by Miss Owen, of South Kensington, and a French *chef*. The audiences have been large, and the exhibition has been very successful. Last Tuesday afternoon, Mr. E. W. T. Richmond delivered an address on "The Use and Abuse of Gas as a Fuel."

The Crisis in the Coal Trade.—Telegraphing last night, our Bolton Correspondent said: The only feature of interest to-day in connection with the stoppage in South-East Lancashire is the extreme quietude which prevails throughout the colliery district. Some little difficulty was anticipated with the non-unionists, who number about 5000 out of a possible 21,000 in this district; but returns at head-quarters show that they have combined with Union men, and not resumed work. Underground operations, in fact, are entirely suspended at all the pits, save were day men are employed keeping roads clear and repairing, in view of work being resumed on Monday next. As the resolution of the Manchester conference simply prohibited coal being got, many of the men are engaged unstacking and loading at the pit banks.

The Bradford Corporation Water and Lead-Poisoning.—At a meeting of the Eccleshill Local Board last Tuesday, Dr. Aston, the Medical Officer of Health, read a special report on lead-poisoning in the Eccleshill district, in which he affirmed that during his thirty years' experience he had never encountered cases of so grave a character as now. This, he said, was really a lead-ridden community. Twenty-five samples of water had been taken from different parts of the township, and had been reported upon by Mr. Rimmington, the Borough Analyst, who stated that twenty-three contained lead averaging ¼ grain per gallon, and in one case ¾ grain per gallon. He (Dr. Aston) has seen six or seven cases of lead-poisoning per day. The members were of opinion that these matters should be laid before the Bradford Corporation Water Committee.

The Supply of Water to High Levels.—The Barnstaple Magistrates recently had before them a case involving a point of interest to the Water Company and to their customers in the high levels of the town. Mr. W. E. Pitts-Tucker, a solicitor, was summoned for the non-payment of water-rates, amounting to £2 2s. The sum of £1 15s. had been paid into Court; the remaining 7s. representing an additional charge of one-fifth which the Company claim to be able to levy on high-level consumers. The case raises the question whether section 6 of the Company's Act of 1888 empowers them to charge one-fifth extra for water supplied by means of their works. The Town Council last year submitted the section to the Attorney-General and the Recorder of Barnstaple, who decided that it did not confer the power. The section in question is as follows: "In the cases in which the Company shall supply water at a pressure above or greater than that afforded by gravitation, either from the now existing reservoir or from any other reservoir supplied otherwise than by pumping from a reservoir or pumping-station at a lower level, the Company may demand and take, in respect of such supply, an additional rate not exceeding one-fifth part of the charge authorized by the Act of 1858." For the Company, it was maintained that the section was eminently fair and equitable, inasmuch as they were put to great expense in providing for the supply of water to the higher levels. The section was ambiguous; but the governing idea of the section was that an extra charge might be made where the supply was by pressure greater than that afforded by gravitation from the now existing reservoir. When two contradictory interpretations could be arrived at, the Court was permitted to consider the consequences of the interpretations. The common-sense reading was in favour of the Company. For the defence, it was urged that the section specially provided against the levying of an additional rate on water supplied from the new reservoir at Pickard's Down, to which the water was pumped from the old reservoir. The Bench, with one dissentient, decided in favour of the defendant; but they granted a special case.

Clevedon Water Company.—At the recent ordinary general meeting of this Company, the Directors' report and balance-sheet were passed, allowing a dividend of 6 per cent. per annum, free of income-tax. The receipts amounted to £2302, including £2081 for water-rents. The profits were £1294, of which £1020 was absorbed in dividend.

Gas Exhibition in York.—In the presence of Mr. C. Sellers and a large audience, the High Sheriff of York (Mr. Forster) opened on Monday evening last week an exhibition of gas appliances, promoted by Messrs. Richmond and Co., Limited, of Warrington and London, in the Central Hall, Exhibition Buildings, York. Mr. E. W. T. Richmond gave an amusing sketch of "Gas *versus* Coal in Our Kitchens." In spite of the very heavy snowstorms and the inclement weather prevailing, the exhibition was a decided success.

Electric Lighting at the Mansion House.—An installation of electric lighting has just been completed at the Mansion House for the Corporation of the City of London, and a private view took place on Monday last week. The installation consists of 825 glow lamps ranging from 5 to 50 candle power, which have been fitted over the whole of the Mansion House; the chief rooms being the Egyptian Hall, the Venetian room, the long parlour, saloon, state drawing-room, the Lady Mayoress's boudoir, and the justice-room. The work has been carried out to the specification of Mr. W. H. Preece, F.R.S., by the Planet Electrical Engineering Company; and the current is supplied by the City of London Lighting Company.

Visit of the Manchester Gas Committee to London.—The Gas Committee of the Manchester Corporation came to the Metropolis last week on a visit of inspection. The deputation comprised the Chairman (Mr. J. Brooks), Deputy-Chairman (Mr. R. Gibson), the Superintendent of the Gas Department (Mr. C. Nickson), and seventeen members. On Wednesday morning they visited the works of the City and South London Railway Company at Stockwell, for the purpose of seeing the dynamos, engines, and boilers at work. They then took a trip on the railway to the City; and subsequently went to the Crystal Palace to inspect the Electrical Exhibition. On Thursday they went down to Beckton to see the large four-lift holder, capable of containing about 8 million cubic feet of gas, in course of erection there by Messrs. C. and W. Walker.

The South Essex Water Company and the Supply of Water to Re-let Houses.—Last week, an application was made to Justices Cave and Collins, in the Queen's Bench Division, on behalf of the above Company, for a rule *nisi* calling upon the local Justices to show cause why they should not state a case for the opinion of the Court by way of appeal from a conviction against the Company for having cut off the supply of water from a certain house at Brentwood. The facts were reported in the JOURNAL for Oct. 13 last (p. 679); and it may be remembered that the Company were ordered to pay a fine for a considerable time, with costs. The Justices had declined to state a case in the form which the Company deemed necessary in order to raise all the points of law. The case arose upon a question as to whether certain connections should be made by the Company or by the occupier of the premises. Their Lordships held that the Justices had already stated a case, and that the Court could not interfere. The application was therefore refused.

The Sewage Question at Cambridge.—The question of the diversion of the sewage of Cambridge from the River Cam has occupied the attention of the Local Authority for upwards of a quarter of a century; but at length a complete scheme has been resolved upon. The Town Council adopted some time ago a scheme of main drainage upon lines laid down by Mr. J. T. Wood, of Liverpool; and the important question of the disposal of the sewage recently came up for decision. Acting upon the advice of Professor Dewar, the Jacksonian Professor of Natural Experimental Philosophy, the Committee having the subject in hand recommended the acquisition of 67 acres of land at Chesterton, for the purpose of precipitating the solids and utilizing and purifying the effluent. The Chesterton Rural Sanitary Authority are to be invited to join in this scheme, which is a compromise between broad irrigation and a system of precipitation pure and simple. The subject provoked a long discussion; but in the end all the Committee's recommendations were adopted by large majorities. Instructions were given to prepare the plans for the completion of the whole scheme; and application was ordered to be made to the Local Government Board for leave to borrow the money. The plan now adopted will cost about £20,000; and the main drainage scheme will involve something like £98,000—making a total of about £120,000.

Opposition to the Swinton Gas Bill.—A meeting of the Eccles Gas Opposition Committee was held last Thursday, to consider what support should be given to the Eccles Local Board in their opposition to the Swinton Gas Bill. A letter was read from Mr. George Trenbath (Clerk to the Local Board), stating that the Committee appointed by the Board to oppose the Gas Bill would carry out the ascertained wishes of the ratepayers. A resolution was passed by the meeting appointing a Sub-Committee to give evidence on behalf of the Committee against the Bill, with instructions to accept no alternative scheme. The Committee felt that the position of the Swinton Local Board was untenable, and that, in face of the 8th clause of the petition of the Salford Corporation, the Gas Bill would certainly be thrown out. This clause reads: "Your petitioners object to be compelled to sell the outer gas undertaking to the Swinton Local Board alone. Your petitioners submitted, subject to certain conditions, to sell it to the two Local Boards whose districts comprise the greater part of the outer gas undertaking; but your petitioners had no intention to do that which the Bill requires, but which the section does not direct them to do—viz., to sell to one of the Local Boards whose district comprises only a small part of the gas undertaking, and who are thereby seeking to place themselves, so far as regards the Eccles district, in the same position which they allege was so objectionable in the case of your petitioners supplying the Swinton district. Amongst other things, had the Bill been promoted in conformity with such section, your petitioners would have had the security of the two Local Boards for the payment of the purchase-money and costs of arbitration, whereas the security under the Bill—viz., a charge on the general district rate of the Swinton Board—is quite inadequate."

Gas Exhibition at Blackpool.—At Blackpool last week, under the auspices of local firms, an exhibition of Messrs. John Wright and Co.'s gas cooking appliances was held with great success. In the absence of the Mayor (Mr. H. Buckley), it was opened on Tuesday by Mr. T. Bickerstaffe. Demonstrations in cookery were given each afternoon and evening by Mrs. J. B. Thwaites; and a strong argument brought forward by her, in advocating the use of gas cookers, was that they are very much cheaper than the fire cooking-ranges, now that the price of coal, owing to the action of the miners, has advanced so greatly.

The Smethwick Gas Undertaking.—At the meeting of the Smethwick Local Board last Friday, the Gas Committee reported that they had received tenders for the alterations required to be made in the retort-house at the gas-works by the adoption of the system of regenerator firing; and they recommended the Board to accept that of Mr. T. Vale, of Stourport, for £1440. The Committee further recommended the acceptance of the tenders of Messrs. Mobberley and Perry and Messrs. King Bros., for retorts, fire-clay, goods, &c.; the contracts to be divided between the two firms. The Committee submitted their annual report and statement of accounts, noticed in the JOURNAL last week, and they were adopted.

Shutting Off Gas at Fires.—On the occasion of a serious fire which recently occurred at Charleton House, Montrose, the Manager of the Gas Company (Mr. T. D. Hall) earned commendation in the local press for having promptly had the gas turned off at the meter, which was situated about half a mile from the mansion. In connection with this event, attention is called to a simple arrangement devised by Mr. Hall for shutting off the supply of gas at a fire in case access could not be obtained to the meter. Mr. Hall proposes to do this by means of a box inserted in the main, and closing the connection with water. The natural property of water to rise to its own level is taken advantage of in this case; and as soon as it reaches the level of the valve, it immediately stops the supply of gas. The water can be afterwards ejected by means of a small hand-pump. The application of this principle to fires is believed to be entirely new, and experiments have in every case proved the plan to be successful. It has the advantage of not entailing much alteration of the piping.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 480.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	10	16—17	..	6 3 6
100,000	10	"	7½	Do. 7 p. c.	10	11½—12½	..	6 0 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	12—14	..	11 8 6
200,000	5	12 Nov.	7½	Bombay, Limited	5	6½—6¾	..	5 11 1
40,000	5	"	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	205—215	..	5 14 1
150,000	"	"	9½	Do. New	100	153—158	..	5 17 1
220,000	20	11 Mar.	11½	Brighton & Hove Original	20	39—41*	..	5 12 2
888,500	Stck.	11 Mar.	5	Bristol	100	95—100*	..	5 0 0
320,000	20	15 Oct.	11½	British	20	43—45	..	5 0 0
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	"	8½	Do. 7 p. c.	10	14—15	..	5 13 4
328,750	10	—	—	Buenos Ayres (New) Limited	10	5½—6½	+½	—
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	93—96	..	6 5 0
150,000	20	26 Feb.	8	Cagliari, Limited	20	24—26	..	6 3 1
550,000	Stck.	15 Oct.	13*a*	Commercial, Old Stock	100	244—249	..	5 4 5
165,000	"	"	10*a*	Do. New do.	100	190—195	..	5 2 7
130,000	"	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
800,000	Stck.	30 Dec.	13	Continental Union, Limited	100	121—226	—1	5 15 1
200,000	"	"	10	Do. 7 p. c. Pref.	100	185—195	..	5 2 7
75,000	Stck.	16 Sept.	10	Crystal Palace District	100	190—200	..	5 0 0
486,090	10	29 Jan.	10	European, Limited	10	19—20	..	5 0 0
354,060	10	"	10	Do. Partly paid	7½	14—15	..	5 0 0
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	210—215	..	5 11 8
100,000	"	"	4	Do. B, 4 p. c. max.	100	94—97	..	4 2 5
665,000	"	"	10	Do. C, D, & E, 10 p.c. Pf.	100	244—249	—1	4 0 4
30,000	"	"	5	Do. F, 5 p. c. Prf.	100	116—121	..	4 2 9
60,000	"	"	7½	Do. G, 7½ p. c. do.	100	169—174	..	4 6 2
1,300,000	"	"	7	Do. H, 7 p. c. max	100	150—154	..	4 10 11
463,000	"	"	10	Do. J, 10 p. c. Prf.	100	241—246	..	4 1 3
476,000	"	"	—	Do. K, 6 p. c. Prf.	100	145—150	..	4 0 0
1,061,150	"	11 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113—116	..	3 9 0
294,850	"	"	4½	Do. 4½ p. c. do.	100	118—123	..	3 13 2
908,000	"	"	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	12 Nov.	12	Imperial Continental	100	220—224	—1	5 7 2
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4—4¼	..	3 13 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	108—110	..	4 10 11
541,920	20	27 Nov.	6½	Monte Video, Limited	20	14½—15½	—½	8 7 8
150,000	5	27 Nov.	10	Oriental, Limited	5	8¼—8¾	—¼	5 14 3
60,000	5	30 Sept.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2¾—3¼	..	—
				People's Gas of Chicago—				
420,000	100	3 Nov.	6	1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	100—105	..	5 14 3
150,000	10	15 Oct.	10	San Paulo, Limited	10	9—10	..	10 0 0
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	266—271	..	5 14 5
1,350,000	"	"	12	Do. B do.	100	220—225	..	5 6 8
200,000	"	"	13	Do. C do.	100	232—237	..	5 9 8
725,000	"	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	138—143	..	3 10 0
600,000	Stck.	11 Mar.	11½	Tottenham & Edm'nton, Orig.	100	—	..	—
				WATER COMPANIES.				
729,331	Stck.	30 Dec.	10	Chelsea, Ordinary	100	240—250	—7½	4 0 0
1,720,560	Stck.	15 Oct.	8	East London, Ordinary	100	198—203	—5	3 18 10
544,440	"	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	136—140	..	3 4 3
700,000	50	11 Dec.	8	Grand Junction	50	95—100	—2½	4 0 0
708,000	Stck.	12 Feb.	10½	Kent	100	255—265	—2½	3 19 3
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	216—221	—6	4 6 0
406,200	100	"	7½	Do. 7½ p. c. max.	100	187—192	—2	3 18 1
260,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	325—335	—2½	3 12 4
1,000,000	Stck.	29 Jan.	4	Do. 4 p. c. Deb. Stk	100	124—127	..	3 3 0
902,300	Stck.	30 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	135—145	—6¼	4 9 8
126,500	100	"	6½	Do. D 7½ p. c. do.	100	140—145	..	4 9 8
1,155,066	Stck.	11 Dec.	10	West Middlesex	100	242—247	—2	4 1 0

*Ex div.

a Next dividends will be at this rate.

Water-Works for Southminster.—The Local Authority of Southminster are proposing to construct works for the purpose of supplying water to the district at a cost of £2000. At a Local Government Board inquiry held on the subject, by Colonel C. H. Luard, R. E., last Friday week, it was shown that the present supply was derived from wells, which had been pronounced by the Medical Officer (Dr. Thresh) both as unfit and inadequate for the wants of the inhabitants. The Inspector did not give much encouragement to hope that the Local Government Board would accede to a request that the repayment of the borrowed money should be spread over a period of 60 years instead of 30 years.

Sales of Shares.—At a recent sale by auction, Messrs. Penney and Clark, sold the following shares in the *Portsea Island Gas Company*: Two £53 shares "A" series, which realized £113 each; seven £50 "B" series which produced £106 apiece; and eight £50 "C" series which yielded from £100 to £102 each.——Last Tuesday, Messrs. Balls sold at Halsteed 48 debentures bands of £50 each in the *Halstead Gas Company, Limited*, bearing interest at 4½ per cent. The bonds were put up in lots of two each; the prices realized being from £100 to £102 per lot.——Last Thursday, £105 stock of the *Dover Gas Company* was sold for £174; four £10 shares, for £17 2s. 6d. each; 49 similar shares, at £17 to £17 2s. 6d. per share; and a £200 mortgage for £207.

Improvements at the Wallasey Gas-Works.—Last Friday week, a Local Government inquiry was held at Egremont, by Mr. T. Codrington, C.E., and Mr. E. P. Burd, Inspectors of the Local Government Board, into an application by the Wallasey Local Board to acquire certain land belonging to the Midland Railway Company and Mr. R. C. de Vyner, on which to erect and maintain gas-works; to authorize the borrowing of additional money for gas and ferry purposes; and to make amended provision with regard to the depreciation fund established under the Wallasey Improvement Act, 1872. Mr. Danger, the Clerk to the Board, stated that the Gas Engineer (Mr. H. Ashton Hill) had reported as to the insufficiency of the gas-works; and it was found absolutely necessary that the plant should be extended to meet the requirements of the district. A provisional contract had been made for the purchase of 12 acres of land, at a cost of about £18,000. If it was found that electricity could be supplied as cheaply as gas, they might use the land for that purpose. There was no opposition.

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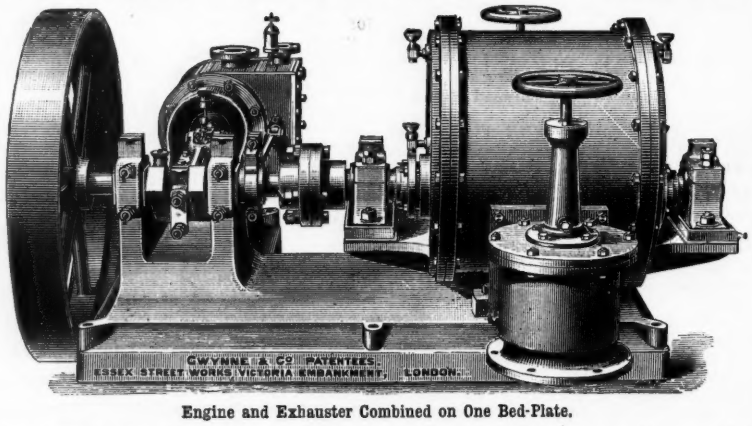

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NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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SUBSCRIBERS to the Masonic Charities are reminded of the case of the Son of the late Bro. FRANK HENRY HARRIS; and are asked to kindly RESERVE THEIR VOTES for this Candidate. The case was referred to in the JOURNAL OF GAS LIGHTING for the 16th ult. (p. 293); and proxies may be sent to Bro. J. ELY, Gas-Works, ABINGDON, or to the Office of the JOURNAL, when they will be duly acknowledged.

WANTED, a good Second-hand PHOTOMETER.

Apply, stating particulars and price, to J. M. DUNCAN, Undercraig, Langbank, RENFREWSHIRE.

GAS-METERS FOR SALE.

THE Royal Agricultural Hall Company, Limited, Islington, have FOR SALE one 500-LIGHT DRY METER, and one 200-LIGHT DRY METER, which until recently have been used at the Hall, and are in good working order.

Apply to R. VENNER, Secretary, Royal Agricultural Hall Company, Limited, Islington.

MICROSCOPE for Sale—First-class Powell and Lealand Monocular. Bright as new. Mechanical Stage, ⅛, ¼, 1 inch Objectives, Two Eye pieces, Erecting-glass, Bull's Eye, and Achromatic Condenser. Mahogany box. Cost £46. Price £23.

Apply to Mr. MORRISON, 4, Earl's Court Road, LONDON, S.W.

BOROUGH OF CHORLEY.

THE Corporation of Chorley are about to appoint a GAS MANAGER and ENGINEER. The person appointed must devote his whole time to the duties of the office, and will be required to enter into a Bond in the sum of £250 for the due discharge of such duties.

Salary to commence at £250 per annum, with such future advances as the Gas Committee may fix.

The duties of the Gas Engineer do not include the collection of Moneys or Gas-Rents.

Applications, stating age, qualifications, and previous employment, with not more than three testimonials of recent date, to be sent to me on or before Tuesday, the 22nd of March, 1892.

THOS. A. JACKSON,
Town Clerk.

Town Hall, Chorley.

SHEFFIELD UNITED GASLIGHT COMPANY.

WORKS SUPERINTENDENT.

WANTED, by the Directors of this Company, an experienced and competent man to act as SUPERINTENDENT at their Effingham Street Gas-Works. He will be required to reside on the Works, with House, Coal, and Gas free.

The maximum make of Gas at this Station is about 3½ million cubic feet per day.

Applications (marked "Superintendent"), stating age, previous engagements, and salary required, to be made by letter only, addressed to Sir Fredk. T. Mappin, Bart., M.P., Chairman of the Company, Gas Offices, Sheffield, not later than Saturday, March 26, 1892.

Testimonials not to be sent till asked for.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
March 5, 1892.

MESSRS. Wheatley and Mackenzie beg to say that they have acquired the business of the late **W. H. BENNETT, Esq.,** and that having a special experience in matters connected with Gas, Water, and Sanitary Improvement, will continue to give the same assistance to Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, or LETTERS PATENT.

Patents completed or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to WHEATLEY AND MACKENZIE, 40 Chancery Lane, LONDON, W.C.

FOR SALE, cheap—Two Gasholders, 35 ft. diameter by 12 ft. deep. Capacity, 11,500 cubic feet each. Also various other larger sizes.

Two PURIFIERS, 24 ft. by 16 ft. by 4 ft. 6 in. deep, with Valves and Connections.

Four PURIFIERS in a group, 16 ft. by 12 ft. by 3 ft. 9 in. deep, 12-inch Centre-Valve and Connections. Also various other sizes.

WASHERS, from 500,000 to 250,000 feet per diem.

CONDENSERS, from 500,000 to 10,000 feet per diem.

EXHAUSTERS, from 120,000 to 5000 feet per hour.

STATION METERS, from 100,000 to 1500 ft. per hour.

Would erect any of the above, and make practically equal to new.

Inquiries invited for any second-hand Gas Plant.

Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

HALIFAX CORPORATION GAS-WORKS.

FOR SALE—The following MOUTH-PIECES, made by Tangye Bros., and fitted with Morton's Self-Sealing Lids. Socket Outlets for 5-inch Pipes.

Tenders for the whole, or part, of the Mouthpieces to be sent to the undersigned.

Delivery free on rails, Halifax.

90 D-shaped Mouthpieces, 20 in. by 14 in., with Vertical Outlets.

16 D-shaped Mouthpieces, 20 in. by 14 in., with Outlets inclined to the right.

19 D-shaped Mouthpieces, 20 in. by 14 in., with Outlets inclined to the left.

THOS. HOLGATE,
Gas Engineer.

March 5, 1892.

BRIGHOUSE LOCAL BOARD.

TO GASHOLDER MAKERS.

THE Brighouse Local Board invite TENDERS for the Excavator's, Concretor's, and Engineer's Work required in the erection and completion of a WROUGHT-IRON ANNULAR TANK and THREE-LIFT TELESCOPE GASHOLDER, 120 feet diameter by 25 feet deep, at their Gas-Works, Brighouse.

Plans and Specification may be seen, and Bill of Quantities obtained, upon application to the undersigned.

Sealed tenders are to be sent in, addressed to Frederick Laxton, Esq., Chairman of the Local Board, Public Offices, Brighouse, endorsed on the outside "Tender for Gasholder and Tank," and are to be delivered on or before Tuesday, the 5th day of April, 1892.

The Local Board do not bind themselves to accept the lowest or any tender.

JAMES PARKINSON,
Engineer and Manager.

Public Offices, Brighouse,
March 12, 1892.

C. & W. WALKER'S
GASHOLDERS; PURIFIERS;
PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

PATENT SELF-SEALING RETORT MOUTHPIECES;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SOLE MANUFACTURERS OF WECK'S PATENT CENTRE-VALVE;

PATENT TAR PLANT; CONDENSERS;

SLIDE VALVES; TAR BURNERS; &C., &C.

WOOD SIEVES.

ADDRESSES:

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE;

10, Finsbury Square, London.

"FORTRESS DONNINGTON." "FORTRESS LONDON."—Telegraphic.

ALTRINCHAM GAS COMPANY.

TO BE SOLD—a Gasholder, 80 feet in diameter and 22 feet deep, single-lift, with Trussed Roof and Cast-Iron Guide Framing.

The person whose tender is accepted will be required to take the Holder in pieces, and remove it from the Premises of the Gas Company forthwith.

Full particulars on application to Mr. J. E. Lamb, Manager, Gas-Works, or to Mr. T. Newbigging, C.E., 5, Norfolk Street, Manchester.

By order,
F. R. B. LINDSELL,
Secretary.

Altrincham, March 12, 1892.

ALTRINCHAM GAS COMPANY.

TO CONTRACTORS AND OTHERS.

THE Directors of the Altrincham Gas Company are prepared to receive TENDERS from experienced Contractors for the construction of a BRICK GASHOLDER TANK, 102 feet in diameter and 24 feet deep.

The Drawings and Specification may be seen at the Gas-Works, on application to Mr. J. E. Lamb, Manager, and at the Office of Mr. T. Newbigging, C.E., 5, Norfolk Street, Manchester.

Quantities and Form of Tender may be obtained from the latter after the 18th inst., on deposit of Two Guineas, to be returned on a *bonâ fide* tender being sent in.

Tenders, endorsed "Gasholder Tank, Contract No. 1," to be sent so as to reach me before Noon on Thursday, the 31st inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
F. R. B. LINDSELL,
Secretary.

Altrincham, March 12, 1892.

ULVERSTON LOCAL BOARD.
(GAS DEPARTMENT.)

TO GASHOLDER MANUFACTURERS.

THE Gas and Water Committee invite TENDERS for the construction and erection of a TELESCOPIC GASHOLDER, 80 feet in diameter, and 20 feet deep.

Drawings and Specifications may be seen, and all information obtained, on application to the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

Sealed tenders, endorsed "Gasholder," to be sent in not later than the 28th inst., addressed to the Chairman of the Gas and Water Committee.

JNO. SWAN,
Engineer and Manager.

March 5, 1892.

ULVERSTON LOCAL BOARD.
(GAS DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for the construction of a BRICK and PUDDLE GASHOLDER TANK, 82 feet in diameter, and 20 feet deep.

Drawings and Specifications may be seen, and all information obtained, on application to the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

Sealed tenders, endorsed "Gasholder Tank," to be sent in not later than the 28th inst., addressed to the Chairman of the Gas and Water Committee.

JNO. SWAN,
Engineer and Manager.

March 5, 1892.

NORMANTON GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the construction of a BRICK and PUDDLE GASHOLDER TANK, 80 feet diameter and 20 feet deep, at their Works.

Drawings and Specifications may be seen and information obtained from the Secretary and Manager at the Office of the Company.

Tenders, endorsed, to be sent in to the Office not later than the 25th inst.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
JOHN ARMITAGE,
Secretary and Manager.

Gas Office, Normanton, Yorks.,
March 12, 1892.

NORTH BIERLEY GAS COMPANY.

THE Directors of the above Company invite TENDERS for the purchase of all the AMMONIACAL LIQUOR of 5° Twaddel, and also the surplus TAR produced at their Works, for One year, from the 1st day of April, 1892.

Tenders to be sent in, addressed to the Chairman, on or before Wednesday, the 23rd day of March, 1892, endorsed on the outside "Tender for Tar or Ammoniacal Liquor."

Further information may be obtained on application to Mr. Wm. Oldfield, Manager.

The Directors do not bind themselves to accept the highest or any tender.

By order,
EPM. SUCKSMITH,
Secretary.

Gas-Works, Oakenshaw, near Bradford,
March 12, 1892.

Sale of 462 Gas and Water Shares in the following Undertakings:—

Crystal Palace District Gas Company,
West Ham Gas Company,
North Middlesex Gas Company,
Woking Water Company,
Romford Gas Company,
Waltham Abbey and Cheshunt Gas Company,
West Kent Gas Company,
Ilford Gaslight and Coke Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at One precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS PLANT.

THE Trustees for the District and Harbour of Maryport invite TENDERS for the supply and erection complete at their Gas-Works, Maryport, of the under-mentioned Apparatus—viz., One set of ANNULAR CONDENSERS, Two PURIFIERS with Lifting Apparatus, the removal and re-erection of a SCRUBBER-WASHER, the LINING of an AMMONIACAL LIQUOR TANK, RETORT MOUTHPIECES and FITTINGS, One WASHER, One GAS EXHAUSTER, and one STATION METER.

Specification, with Form of Tender, may be obtained on application.

Tenders, endorsed "Tender for Gas Apparatus," to be sent to the undersigned not later than Noon, on Friday, the 1st of April next.

The lowest or any tender will not necessarily be accepted.

F. KELLY,
Clerk to the Trustees.

Town and Harbour Offices,
Maryport, March 7, 1892.

COUNTY BOROUGH OF BURNLEY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for One, Two, or Three years, from the 1st of July next, for the supply of 3000 tons per annum of CANNEL COAL, to be delivered in such monthly quantities as the Gas Manager of the Corporation may from time to time require.

The Coals must be of good quality, dry; and as free as possible from Sulphur, Bats, Bind, Refuse, and Dirt; and must be delivered into the Wagons of the Corporation at their Wharf on the Leeds and Liverpool Canal, adjoining the Gas-Works.

Any person or persons tendering may be required to send samples of the Coals offered, at the quoted price, before the contract is let.

Tenders must be made upon a form to be obtained on application to me.

They must be sealed, and specify fully the description of the Coals and the Pits at which they are to be raised, and must be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, endorsed "Tender for Cannel," and posted not later than Wednesday, the 30th of March, 1892.

By order,
ROBERT E. FOX,
Town Clerk.

Town Hall, Burnley,
March 11, 1892.

OTTOMAN GAS COMPANY, LIMITED.

NOTICE is hereby given, that the ORDINARY MEETING of the Shareholders in the above Company will be held at the Offices of the Company, 9, Queen Street Place, Cannon Street, E.C., on Tuesday, March 22, at One o'clock, for the purpose of receiving a Report and Statement of Accounts from the Directors for the Half Year ending Dec. 31, 1891.

The Transfer Books will be closed from March 15 to 22, both days inclusive.

By order,
ARTHUR J. KING,
Secretary.

9, Queen Street Place,
Cannon Street, E.C., March 8, 1892.

COMMERCIAL GAS COMPANY.

NOTICE is hereby given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Friday, the 1st of April, 1892, at to Twelve o'clock at Noon.

To receive the Report of the Directors.
To declare a Dividend.
To elect Directors and an Auditor in the place of those retiring.
And for other Business.

The Stock Transfer Books will be closed from the 19th of March inst. to the 1st of April next, both days inclusive.

By order of the Board,
H. D. ELLIS,
Secretary.

Offices, Stepney, March 9, 1892.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is hereby given, that the HALF-YEARLY ASSEMBLY OF PROPRIETORS will be held at the Company's Office, St. Helen's Place, Bishopsgate, E.C., on Tuesday, the 5th of April, 1892, at Twelve o'clock Noon precisely, pursuant to Act of Parliament.

The Transfer Books in respect of the Ordinary Stock will be closed on the 22nd of March inst., and reopened on the 12th of April, on which day the Dividends on this Stock will be payable.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place, E.C.,
March 10, 1892.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given, that the Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 30th inst., at half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is hereby also given, that the Transfer Books of the Company will be closed on the 19th, and reopened on the 31st inst.

By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 11, 1892.

SOUTHWARK AND VAUXHALL WATER COMPANY.

SALE BY TENDER OF £100,000 FOUR PER CENT. DEBENTURE STOCK.

NOTICE is hereby given, that it is the intention of the Directors of the Southwark and Vauxhall Water Company to SELL BY TENDER, to be received at the Company's Office, Southwark Bridge Road, S.E., not later than Twelve o'clock on Tuesday, March 22, 1892, £100,000 of DEBENTURE STOCK of the Company.

The Stock now for sale is the first portion of the sum of £300,000 of Debenture Stock, authorized to be raised by the Southwark and Vauxhall Water Act, 1891, and will be entitled, on and from the 31st of March, 1892, to interest at the rate of Four per cent. per annum. It wil be consolidated with the Company's existing Four per Cent. Debenture Stock, and will rank before the whole of the Company's authorized Stock and Share Capital, now amounting to £1,518,000, the whole of which is paid up, and the Interest thereon will have priority of payment over all Dividends or Interest on such Capital, and will rank *pari passu* with the Interest on all the Company's existing Debenture Stock.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Southwark Bridge Road, S.E.

By order of the Board of Directors,
ALFRED JELLEY, Secretary.

Southwark Bridge Road, S.E.,
March 4, 1892.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

L. MONK & CO.,
Cannel and Gas Coal Merchants,
34, ST. ANDREW SQUARE,
EDINBURGH.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

THE SILICA FIRE-BRICK
COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS,
BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

GASHOLDERS

C. & W. WALKER

Have erected Gasholders of all dimensions, during the last 40 years, in all parts of Great Britain, and throughout the civilized world, for upwards of 500 Gas Companies and Municipalities; all of the best materials and highest class of workmanship.

They are now erecting a four-lift Holder of about 8 MILLION cubic feet, at the Beckton Gas-Works, London.

MIDLAND WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE;

AND

10, Finsbury Square, London, E.C.

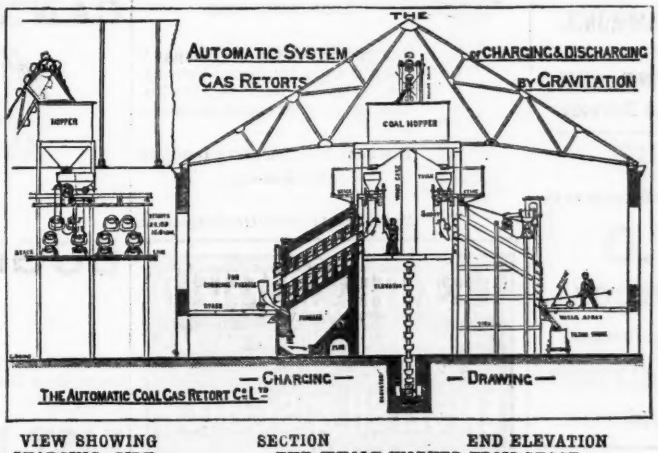
AUTOMATIC SYSTEM OF
CHARGING & DRAWING INCLINED GAS-RETORTS.

GOLD MEDAL PARIS EXHIBITION, 1889.

This System of Automatically Charging and Discharging Retorts without arduous labour is also in operation at several places on the CONTINENT, AMERICA, AUSTRALIA, &c., &c.

GAS and CHEMICAL WORKS in ENGLAND where the System is in operation, or at present erecting, under the Company's Licence—

LONDON—
BECKTON.
BRENTFORD.
EAST GREENWICH.
KENSAL GREEN.
NINE ELMS.
PIMLICO.
SOUTHALL.
BIRKENHEAD.
BIRMINGHAM.
BURNLEY.
CHATTERLY.
COVENTRY.
MANCHESTER.
MIDDLESBROUGH.
OXFORD.
ROCHDALE.
TUNSTALL.



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Advantages—

1. NO SKILLED LABOUR.
2. WEAR AND TEAR OF CARBONIZING TOOLS REDUCED.
3. GREAT REDUCTION IN THE ERECTION OF ASCENSION-PIPES AND HYDRAULIC MAIN.
4. SAVING 70 PER CENT. IN COST OF LABOUR.
5. SAVING 50 PER CENT. IN SPACE OF PERMANENT BUILDINGS.
6. ABSOLUTE CONTROL OF PRODUCTION BY UNSKILLED LABOUR (THIS IS IMPORTANT, ESPECIALLY WHERE THERE IS AN EXTRA DEMAND FOR GAS, AS IN THE CASE OF FOGGY DAYS, OR MEN ON STRIKE, &c.)
7. COAL CARBONIZED ONE-SIXTH QUICKER THAN BY THE OLD PROCESS.

RETORTS 24 in. X 15 in. D's 15 FEET LONG. SIX IN A BED.
WITH OR WITHOUT REGENERATIVE SETTINGS.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

For further particulars apply to W. M. KIGHT, Secretary of THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86 and 88A, LEADENHALL STREET, LONDON, E.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

MARKS & RUSSELL,
Cannel and Gas Coal Merchants,
53, WATERLOO STREET,
GLASGOW.

MEIKLEJOHN'S PATENT
Improved Slide-Valve Anti-Dip.
Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
Further particulars and price from
C. MEIKLEJOHN,
OLDBURY, BIRMINGHAM.
(Late N. Meiklejohn, Longwood.)

PATENTS FOR INVENTIONS,
REGISTRATION OF TRADE MARKS and DESIGNS in all Countries.
SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*
J. C. CHAPMAN,
Assoc.M.Inst.C.E., M.Inst.M.E., Chartered Patent Agent,
70, CHANCERY LANE, LONDON, W.C.
Special experience in Gas and Ammonia Plant.

THOMAS ILLINGWORTH,
NORTH DEAN CHEMICAL WORKS
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.
TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

NEWBATTLE CANNEL.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

HOLMSIDE GAS COALS.
(Wrought out of Holmside and South Moor Collieries.)
PRESENT production nearly 3000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1½ per cent. The Coal cokes well, and leaves 69 per cent. of excellent Coke. During the year 1890, the London Gas Companies carbonized about 400,000 tons of HOLMSIDE COALS. They are used by The Gaslight and Coke Company, the South Metropolitan Gas Company, the Commercial Gas Company, the Woolwich (Government) Gas-Works, the Newcastle and Gateshead Gas Company, the European Gas Company, the Ipswich Gas Company, and by many other Gas Companies both at Home and Abroad.
MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

AUG. KLÖNNE,
DORTMUND (GERMANY).
REGENERATIVE FURNACES.
Unsurpassed in
Efficiency, Economy, Durability, and Easy Working.

ROSEWELL BOGHEAD.
Yield of Gas per ton . . . 13,215 Cub. Ft.
Illuminating Power . . . 37·56 Candles.
GAVIN PAUL & SONS,
CANNEL COALMASTERS,
EDINBURGH.

THOMAS LIGHTING Co.,
LTD.,
15, CARTHUSIAN ST.,
LONDON, E.C.
Manufacturers of the "Thomas" Patent Lamps for general lighting, also for Public Buildings, Institutions, &c., and for outside purposes.
The best Regenerative Lamp in the Market.
Special quotations to Gas Companies.

T. B. KITTEL, SHEFFIELD.
CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

THOMAS TURTON AND SONS, LIMITED,
Sheaf & Spring Works,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

Lanemark Coal Co.,
LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on application to
LANEMARK COLLIERY,
NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE BOGHEAD CANNEL.
Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.
EAST PONTOP GAS COAL.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.
For Prices and complete Analysis, apply to
YOUNG, DANCE, & CO.,
Coal Owners, Newcastle-on-Tyne.
Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS
HUNSLET.
LEEDS

LONDON OFFICE:
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CLAYTON SON & CO. LTD.

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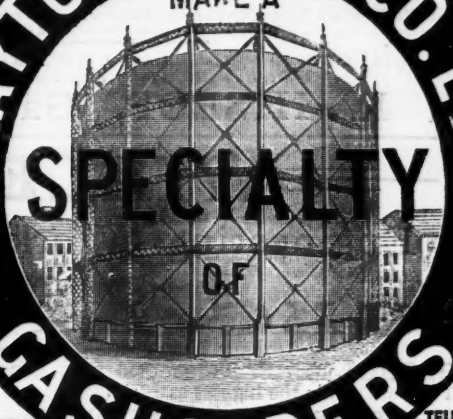

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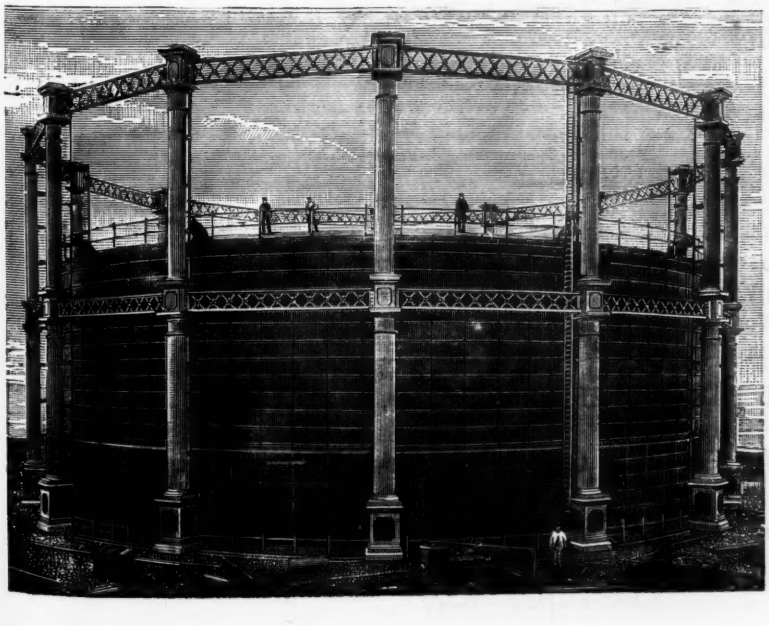

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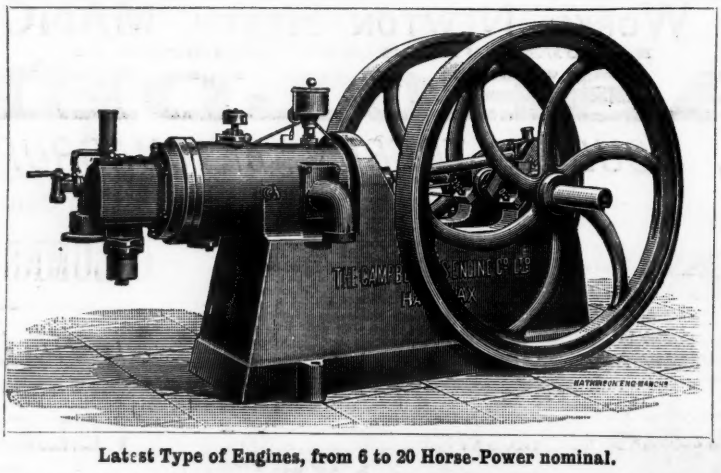

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Latest Type of Engines, from 6 to 20 Horse-Power nominal.

Our Engines are used by Her Majesty's War Department; The South Metropolitan Gas Company, London, S.E.; at the Bedworth Gas-Works; Crossgates Gas-Works; Tiverton Gas-Works; &c.

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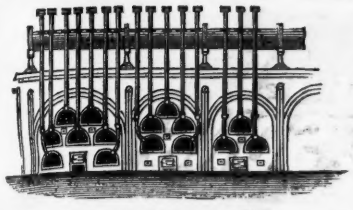

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The most successful and approved Apparatus known up to the present time.

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This Meter has a simple Automatic arrangement fitted, whereby, upon the insertion of a shilling, a supply of gas can be obtained, and which is cut off on the quantity paid for being consumed. The Meter gives warning when the quantity is nearly exhausted, so that another shilling may be inserted. There is, however, no occasion to wait until this happens, as a second shilling can be inserted after two-pennyworth of the first shilling has been consumed.

The Meter is fitted with the ordinary registering dial, and has in addition a circular one divided showing twelve pence. On each Meter is marked the number of cubic feet it will pass for one shilling; and this can be arranged to cover cost of Meter-Rental, Fitting, and Gas consumed. These Meters are made of the best material and workmanship.

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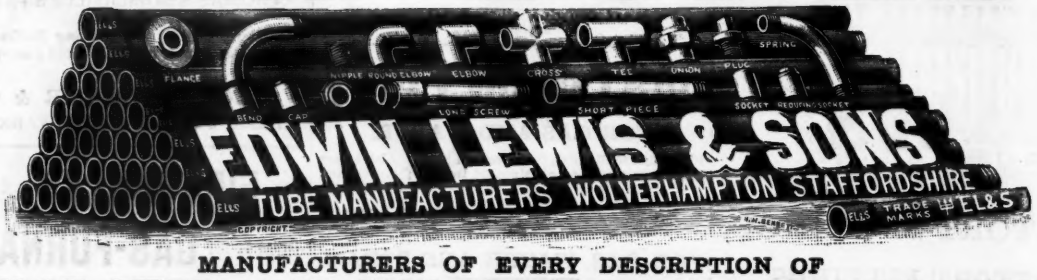

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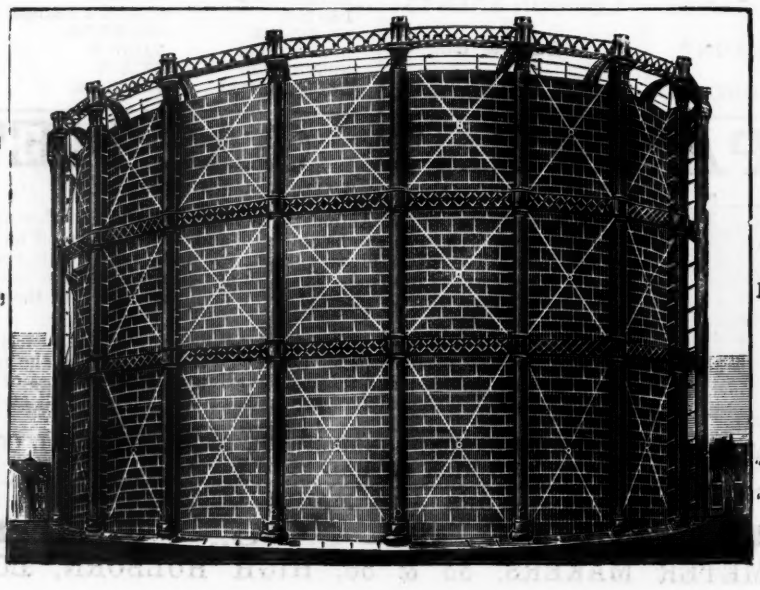

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Westphal's Patent.

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Particulars and Prices Free.

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FOR

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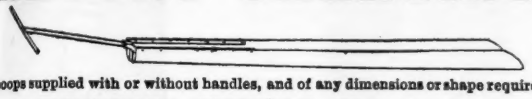

Scoops supplied with or without handles, and of any dimensions or shape required.

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Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

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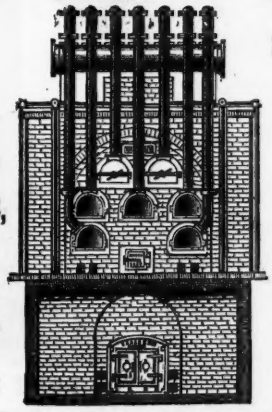

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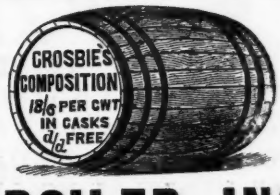

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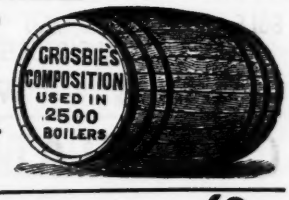
Absolutely Harmless and free from Acids.



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Crosbie's Paints for Gas-Works. Economical and Durable.

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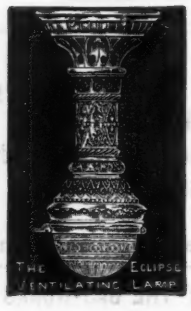
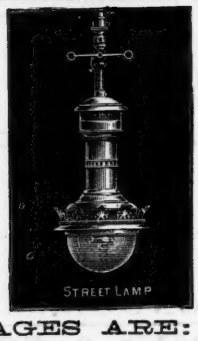
"LIGHT, Wenham Gas Lamps MORE LIGHT."





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INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

Absence of Downward Shadow. *Practical Completeness of Combustion.*

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The Patent Wooden Balls thoroughly break up the Gas; give an immense amount of freshly-wetted Surface; and do not clog or increase back pressure.

Whilst the Gas is passing through and amongst the Balls, it is continually showered upon by the contents of Buckets.

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